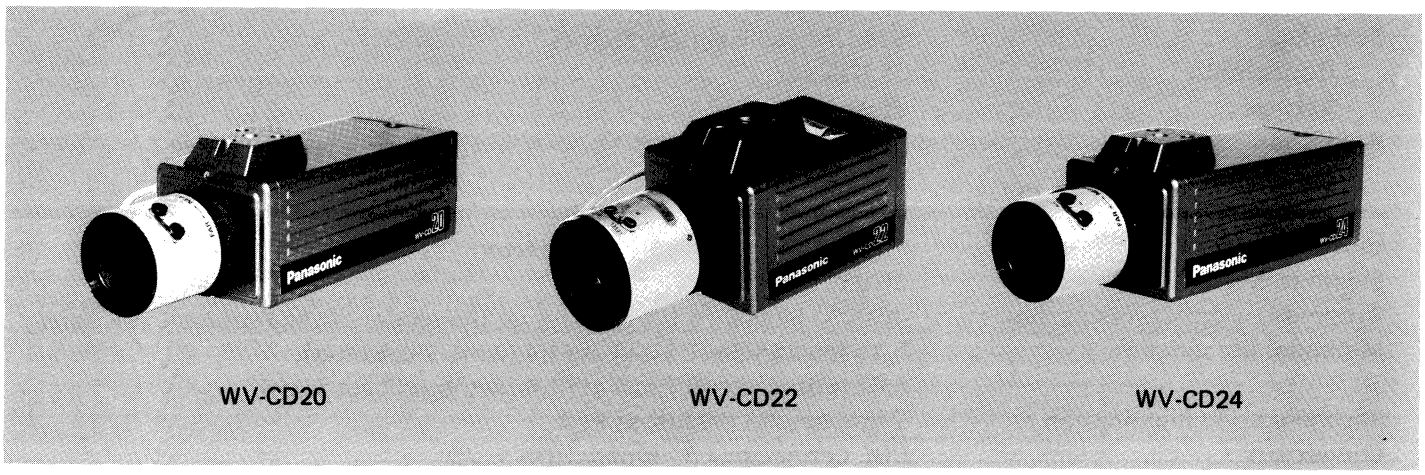
ORDER NO. VKD86040983C8

Service Manual

CCTV Cameras

WV-CD20/WV-CD22
WV-CD24



WV-CD20 WV-CD22 WV-CD24

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National/Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

SPECIFICATIONS

Pick-up Device :	500(H) x 582(V) Element CCD Type
Scanning Area :	6.6 x 8.8mm² (Equivalent to scanning area of 2/3" pick-up tube)
Synchronization :	Internal/External-Line Lock switchable Internal/line lock or external switchable automatically Internal : Built in sync generator or line locked (switchable) External (Gen-lock) : Composite video signal or Composite sync signal Horizontal drive (HD) and vertical drive (VD) pulse (BNC connector)
Scanning System :	2:1 Interlace
Scanning ;	625 Lines/50 Fields/25 Frames
Horizontal :	15.625kHz
Vertical :	50Hz
Resolution ;	
Horizontal :	380 lines at center
Vertical :	410 lines at center
Video Output :	1.0Vp-p Composite/BNC Connector
Signal to Noise Ratio :	50 dB (Typical)
Automatic Light Compensation :	40,000 - 66,000 : 1 (Depending on the model of the Automatic Iris Lens)
Minimum Illumination :	0.15 footcandle (1.5 lux) at F1.4 (with IR cut filter) 0.07 footcandle (0.7 lux) at F1.4 (without IR cut filter)
Recommended Illumination :	5 footcandles (50 lux) at F1.4
Connectors :	BNC Connector x 3 - Video, HD/VS, VD 4P Connector x 1 - Automatic Iris Lens
Lens Mount :	C-Mount
Ambient Temperature :	-10°C - + 50°C (14°F - 122°F)
Power Source :	WV-CD20/B, N/A : 240V AC 50Hz WV-CD20/C, G, N/C : 220V AC 50Hz WV-CD22 : 12V DC WV-CD24 : 24V AC 50Hz
Power Consumption :	WV-CD20 : 6.5W WV-CD22 : 3.6W WV-CD24 : 6.0W
Dimensions : (excluding lens)	WV-CD20/WV-CD24 : 2-3/4"(W) x 2-3/4"(H) x 6-11/16"(D) [70(W) x 70.5(H) x 170(D)mm] WV-CD22 : 2-3/4"(W) x 2-3/4"(H) x 4-5/16"(D) [70(W) x 70.5(H) x 110(D)mm]
Weight (without lens) :	WV-CD20 : 0.9 kg (1.98 lbs) WV-CD22 : 0.5 kg (1.1 lbs) WV-CD24 : 0.75 kg (1.65 lbs)

- **Standard Accessories**
  - Hex-Wrench..... 1 pc
  - ALC Lens Connector... 1 pc
  - Body Cap ..... 1 pc

- **Optional Accessories**

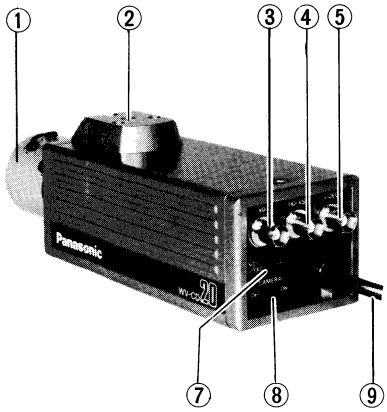
Housing :	WV-7120C	Panning :	WV-7220B
	WV-7130	Head	WV-7230B
	WV-7150C		WV-7260
	WV-7160B		
Mounting :	WV-831	Lens :	WV-LA8B
Bracket	WV-7010		WV-LA16B
	WV-7015		WV-LA25B
			WV-LA50B

Weights and dimensions shown are approximate.
Specifications are subject to change without notice.

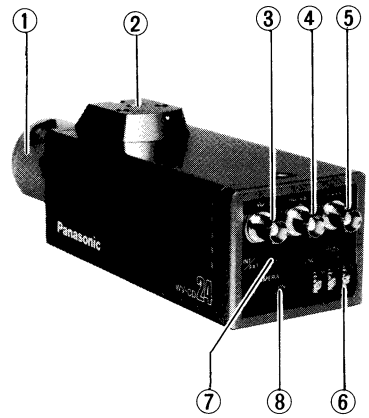
MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS

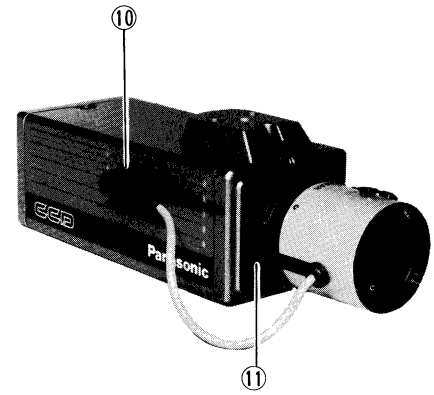
- **CCTV CAMERA WV-CD20/WV-CD24**

WV-CD20

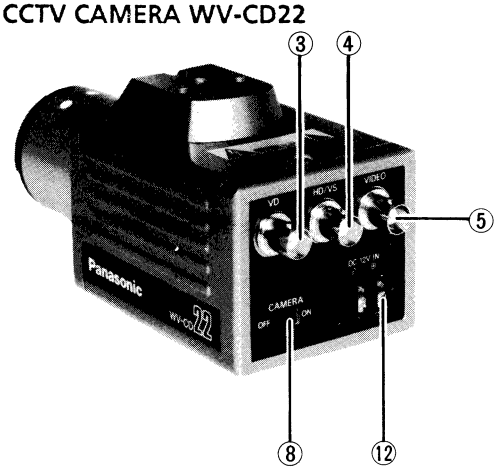


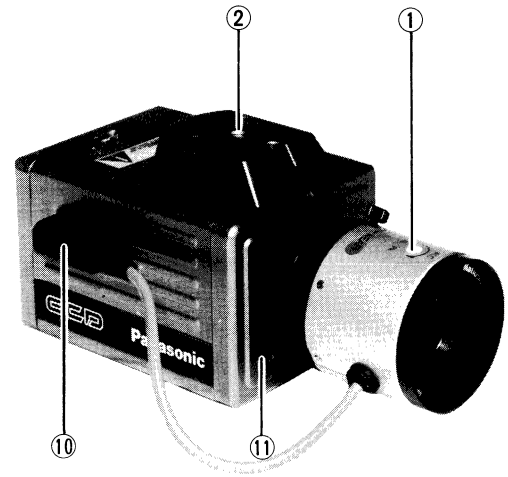
WV-CD24





- **CCTV CAMERA WV-CD22**





① **Automatic Iris Lens (Option)**

② **Camera Mounting Screw Hole**
This hole is used to mount the camera onto a mounting bracket or tripod, and is threaded (1/4"-20).

③ **Vertical Drive Signal Input Connector (BNC Connector)**
Use a coaxial cable with a BNC connector. The vertical drive (VD) signal from pulse generator is connected here.

④ **Horizontal Drive/Video Signal Input Connector (BNC connector)**
Use a coaxial cable with a BNC connector. The horizontal drive (HD) signal from pulse generator or the video signal from external signal source is connected here.

⑤ **Video Output Connector (BNC connector)**
Use a coaxial cable with a BNC connector. Video output signal is fed to a video monitor or VTR.

⑥ **AC 24V In Terminal Strip**
Accepts AC 24V power source (19.5V - 28V). Be sure to connect grounding lead to the GND terminal.

⑦ **Sync Selector Switch (INT/EXT-LL)**
This switch is used to select the sync mode of the camera.
INT/EXT : The sync mode is automatically switched to internal mode or external mode.
When the external sync is connected to the VD and/or HD/VS connector, the sync mode is set to external mode.
For other case, the sync mode is set to internal mode.
LL : The sync mode is line locked mode.

⑧ **Power ON/OFF Switch**

⑨ **Power Cord**

⑩ **Connector for Automatic Iris Lens**
Supplies the power and video signal to the Automatic Iris Lens. The video signal will control the iris with the servo control circuit in the Automatic Iris Lens.

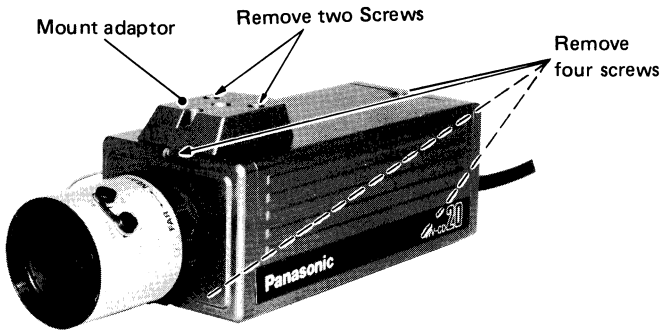
⑪ **Power Indicator**

⑫ **DC 12V In Terminal Strip**
Accepts DC 12V power source (10.5V - 16V).

Set Up/Adjustment of Camera Number

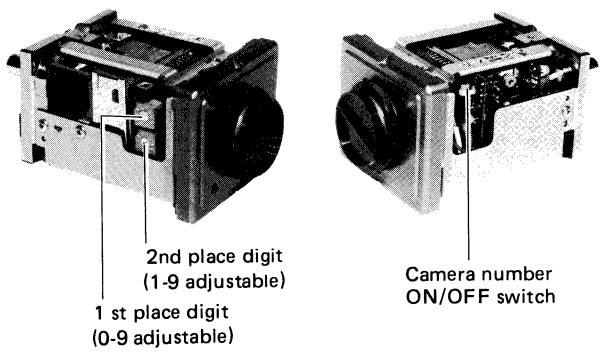
Camera Case Removal

1. Remove the mount adaptor on the top of the camera by removing two fixing screws.
2. Remove four camera case fixing screws and remove the rear panel and camera case by pulling them backward.



Set Up/Adjustment

1. Connect the camera and the video monitor with a coaxial cable.
2. Connect the camera and power source, and turn On the power switches.
3. Turn ON the camera number ON/OFF switch (lower position).
4. While observing the video monitor, rotate two camera number setting switches (SW101, SW102) on the sync board for desired number.



CONNECTIONS

Power Cable

Keep the camera power switched OFF during installation.

A. WV-CD20

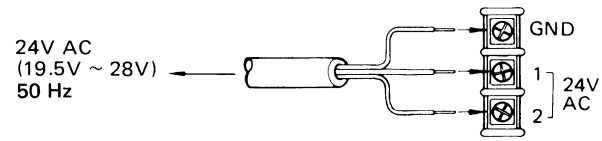
1. Connect the AC Power Cord (9) to a 50Hz electrical outlet 220V or 240V

B. WV-CD22

1. A power supply of 12V DC is required.
2. Connect the power cable to the 12V DC Power Terminal Strip on the rear panel of the camera. Be careful not to obstruct the operation of camera ON/OFF switch.

C. WV-CD24

1. A power supply of 24V AC 50Hz is required.
2. Connect the power cable to the 24V In Terminal Strip (6) on the rear panel of the camera.



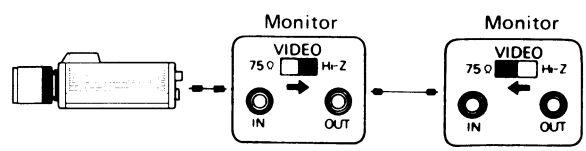
Recommended wire guage sizes for 24V AC line.

Copper wire size (AWG)	#24 (0.22mm²)	#22 (0.33mm²)	#20 (0.52mm²)	#18 (0.83mm²)
Length of Cable (Approx.) [ft]	340	550	850	1400

Wire should have a flame-retardant rating (FR-1).

Video Cable

1. Use a video monitor whose resolution is at least equal to the camera's.
2. Terminate the camera output ;in a 75 ohm resistor at the furthest end of its cable run.
   A. Use 75 ohm coaxial cable. (RG-59/U, RG-6/U, RG-11/U, RG-15/U)
   B. Always set the last monitor's termination switch to 75 ohm, and set the termination switches of intermediate monitors to HIGH (Hi-Z).



C. The maximum extendable coaxial cable length between the camera and the monitor is shown in the table 1. Since cable quality varies among manufacturers, please verify video quality before final installation, if maximum lengths are to be used.

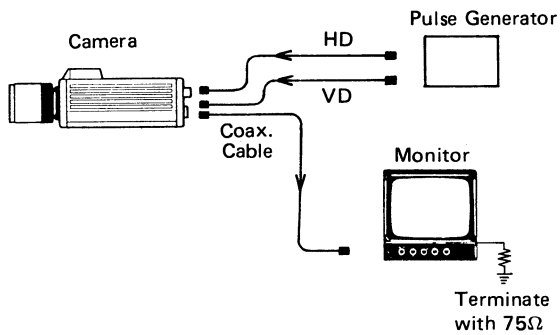
Table 1

Type of coaxial cable		RG-59/U (3C-2V)	RG-6U (5C-2V)	RG-11/U (7C-2V)	RG-15/U (10C-2V)
Recommended Maximum cable length	(ft)	760	1,500	1,800	2,400
	(m)	250	500	600	800

External Sync Cable

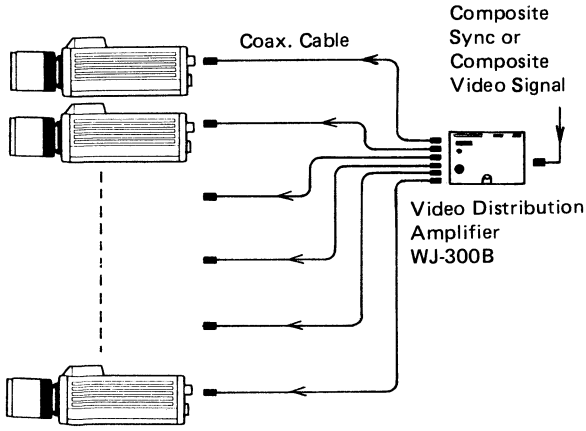
A. Gen-lock using HD and VD pulses

- The camera will be gen-locked by the HD and VD pulses when they are supplied to the HD and VD input connector respectively from a pulse generator (purchase locally).



B. Gen-lock using composite sync or composite video signal

- The camera will be gen-locked by the composite sync or composite video signal when it is supplied to the HD/VS input connector for multi-camera system.



LENSES

(1) Selection of Lens

(A) Lens Mounting (Lens Weight : Less than 0.66 lbs./0.3 kg)

a) See list of optional Automatic Iris Lens, page 6.

b) "C" mount lens may be used. (Refer to page 11 part 6 for detail.)

(B) Focal length of lens vs. viewing dimensions.

If object size and the distance between the object and the television camera are known, a lens of the proper focal length must be selected.

The proper focal length can be determined by the following equations or from the chart shown in the diagram.

If a specific width must be viewed: $f = 8.8\ L/W$

If a specific height must be viewed: $f = 6.6L/H$

f : Focal length of lens (mm)

w : Object width (ft.)

H : Object height (ft.)

L : Distance between object and television camera (ft.)

The length or width of an object, placed at a particular distance that can be picked up with a specific lens, can be calculated from the following equations or from the chart shown in the diagram.

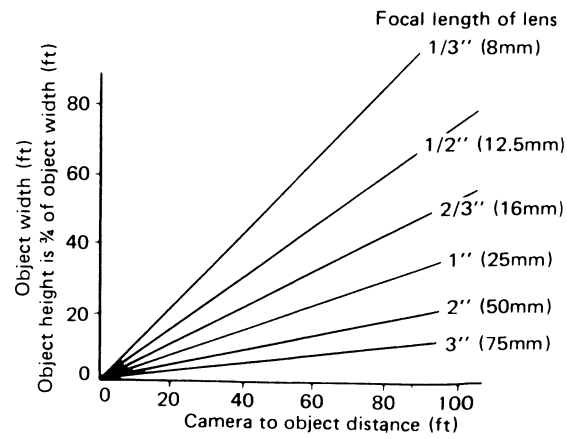
In case object width is important :

$$\text{(Approx.)} \quad W = \frac{8.8L}{f}$$

In case object height is important :

$$\text{(Approx.)} \quad H = \frac{6.6L}{f}$$

Note : Effective coverage angle will be 5 to 10% less of the following angle because video monitor is generally overscanned 5 to 10%.



(2) Optional Lenses

If there is any variation of light, an automatic iris lens must be used because the camera has no internal automatic light compensation.

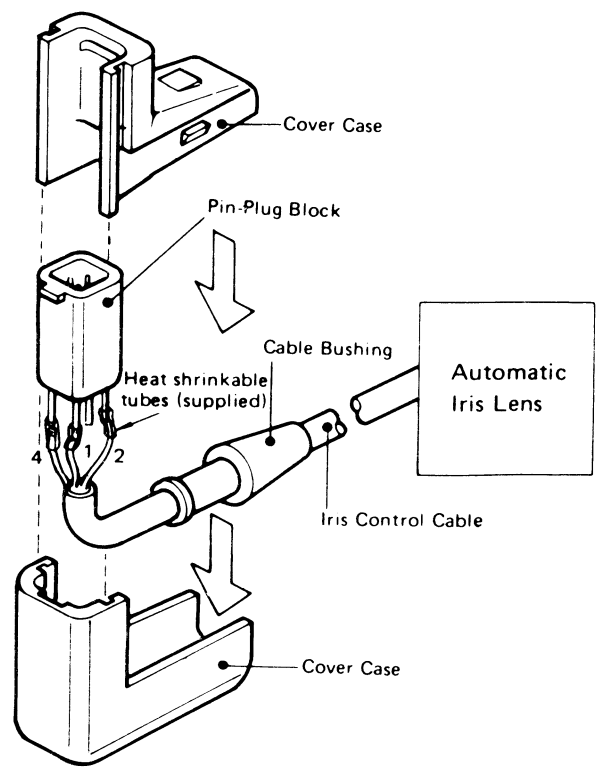
Specification \ Model		WV-LA8B (Wide angle)	WV-LA16B (Standard)	WV-LA25B (Telephoto)	WV-LA50B (Telephoto)
Focal Length		8 mm	16 mm	25 mm	50 mm
Maximum Aperture Ratio		1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.8
Automatic Light Compensation		1 : 66,000	1 : 66,000	1 : 66,000	1 : 40,000
Angular Field of View	H	58.2°	30.7°	20°	10°
	V	44.9°	23.2°	15°	7.5°
Picture Size		8.8 (H) x 6.6 (V) mm (2/3" Pick-up Tube)			
Minimum Focusing Distance		0.7 ft (0.2 m)	1.6 ft (0.5 m)	2 ft (0.6 m)	3.3 ft (1 m)
Mount		C-mount			
Optional Filter Size		φ 43 mm P= 0.75		φ 49 mm P = 0.75	
Dimensions		φ1-13/16" x 2" (φ46.5 x 51 mm)	φ1-13/16"x1-13/16" (φ46.5x46.7mm)	φ 2-7/16" x 2" (φ 62 x 51 mm)	
Weight		0.35 lbs (160 g)	0.29 lbs (130 g)	0.59 lbs (270 g)	0.64 lbs (290 g)

(3) Installation of Connector for Automatic Iris Lens

- For iris control of the automatic iris lens, the TV camera supplies the power and video signal to the lens according to the following pin assignment.
  - Pin 1 : Power : + 9V DC, 50mA Max.
  - Pin 2 : Ground
  - Pin 3 : Open
  - Pin 4 : Video Signal : 0.7Vp-p non-composite (Video input impedance of lens used should be more than 40K ohms.)]
- The lens connector (YWRP97P4P) comes with the TV camera and should be connected to the automatic iris lens as follows.

The following installation should be made by qualified service personnel or system installers.

1. Install the cable bushing (supplied) on the iris control cable of the lens as shown in the figure and put the supplied heat shrinkable tubes on the wires of the iris control cable.
2. Solder the wires of the iris control cable at the pins of the pin-plug block according to the following pin assignment and cover the soldered area with the heat shrinkable tubes and heat to shrink.
   - Pin 1 : Power Source
   - Pin 2 : Ground
   - Pin 3 : Open
   - Pin 4 : Video Signal
3. Install the pin-plug block into the cover case.
4. Both cover cases should be positioned to interlock and slide into each other until both cover cases are locked.

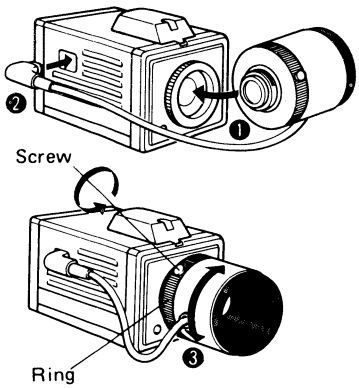


(4) Installation of fixed focal length Auto Iris Lens

① Mount the Auto Iris Lens by turning it clockwise into the lens mount of the camera.

② Connect the lens cable to the Auto Iris lens Connector.

③ Focus the lens with the black ring in back of the lens and tighten the screw to lock the lens at the focus position.



4 PIN MALE PLUG	
PART # YWRP97P4P	
#1	Power
#2	Ground
#3	Open
#4	Video

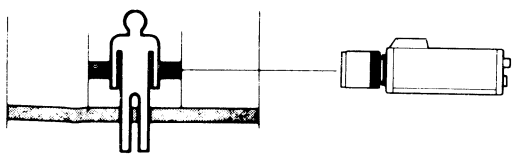
CAUTION :
Do not take off the black cap nor turn the screw. This is the sensitivity control for the lens. For adjustment refer to qualified service personnel only.

(5) Focusing of Auto Iris Lens

When focusing on objects which are within a few meters (6½ ft.) from the camera, the iris should be fully opened. This can be accomplished by making the objects as dark as possible during initial installation. Then, focus on the objects and finally provide normal illumination.

The reason for this procedure is as follows;

The range over which objects will stay in focus (depth of focus) changes with iris setting. If the object is brightly illuminated while focusing and the illumination reduces during certain periods of the day, the iris will automatically open to compensate. Now, thee depth of focus is narrower and the object might no longer be in focus. If focusing is performed with the iris fully opened, you can be certain that the object will stay in focus regardless of changes in illumination.



(6) Requirements when using Non-Automatic Iris Lens

If object illumination is always constant, a lens other than an automatic iris lens may be used.

If object illumination changes even slightly when a lens other than an automatic iris lens is used, the video output signal will change considerably and no image may be reproduced in some cases. If all the conditions mentioned below (a - e) are met, then a lens other than an automatic iris lens may be used.

a) Sunlight will not directly come into the lens.
b) Use indoors only. (Not used outdoors.)
c) Object illumination is never above 120 footcandles (1200 lux). (Lens with an F-number of F16 or below.)
d) Little change in object illumination.
e) Lens has a manual iris.

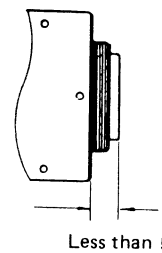
Set-up of Non-Automatic Iris Lens

Adjust the iris as follows.

a) Adjust object illumination to appropriate level.
b) Check image with a video monitor, and adjust lens iris to the best picture quality. The CONTRAST and BRIGHTNESS controls on the video monitor must be kept in the positions to which they have been adjusted with a television camera having an automatic sensitivity control.
(If you have an oscilloscope, adjust the lens iris to a position where video signal level will be 0.7Vp-p)
c) Object illumination permissible range is plus 20% and minus 75% of the level at which the camera was initially set-up. If object illumination varies in excess of this range, the image may bloom, or fail to show at all.
d) A little adjustment of the CONTRAST and BRIGHTNESS controls on the video monitor due to some change in illumination may be made on the video monitor whenever such adjustment is necessary. (If a motor driven zoom lens is used, the lens iris can be readjusted instead of the monitor controls.)

Caution :

The maximum allowable weight of the lens for the lens mount converter is 0.66 lbs (300g) and lens mount should be as shown in the diagram, otherwise the lens will damage the camera.



Less than 5/6"
(Less than 8 mm)

CIRCUIT DESCRIPTION

1. Principle of B/W CCD Camera

Using CCD image sensor
The block diagram of WV-CD20, WV-CD22, WV-CD24 is shown in Fig. 1-1.

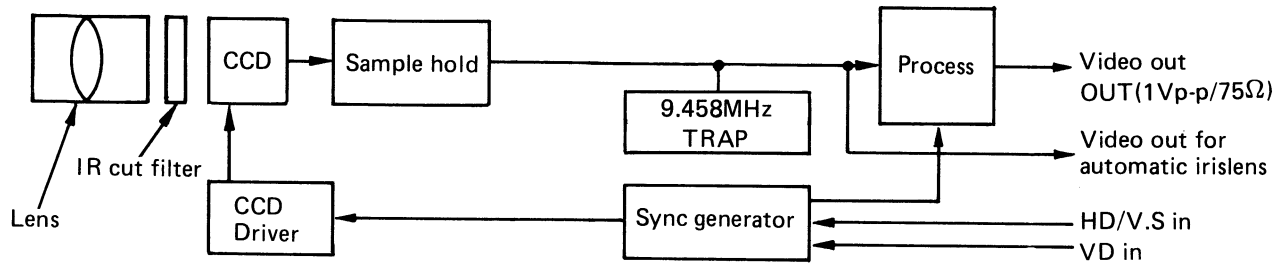


Fig. 1-1 Black diagram for WV-CD20, WV-CD22, WV-CD24

The incoming light which passes through the automatic iris control (AIC) lens and infrared (IR) cut filter reaches the surface of the CCD (Charge Coupled Device) image sensor.

Infrared Cut Filter

As shown in Fig. 1-2, the CCD image sensor has peak sensitivity in near infrared region beyond the visible range. Thee infrared (IR) cut filter cuts off the infrared light rays which the human eye can not normally see, picture on the monitor and that is seen with the naked eye would differ substantially.

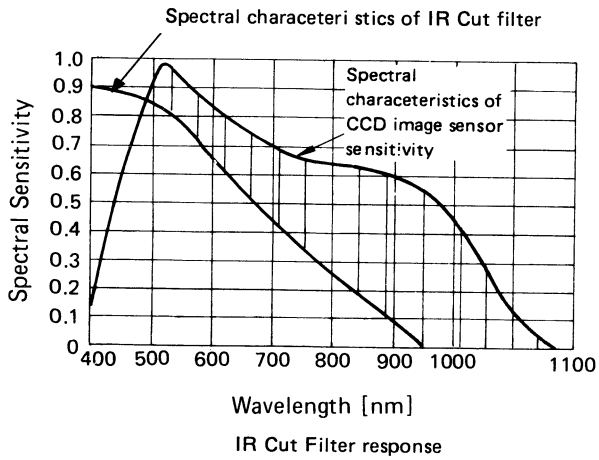


Fig. 1-2

CCD Image Sensor

The CCD image sensor used in camera has MOS type sensor, high sensitivity output amplifier and the interline system. Because of ;this, the CCD image sensor has low noise and high sensitivity characteristic.
The specifications of CCD image sensor CX021L is as follows;

SPECIFICATION OF CX021L

Type:	Interline type CCD image sensor
Unit cell size :	17μm (H) x 11μm (V)
Chip Size :	10.0mm (H) x 9.3mm (V)
Number of element :	500 (H) x 582 (V)
Number of OB :	Left 2, Right 30 (H)
	Bottom 14 (V)
Scanning area :	6.6mm (V) x 8.8mm (H)
Sensitivity :	130 mVp-p
Max. Output :	440 mVp-p
Shading :	11%
Smear :	0.01%

The CCD image sensor has approximately 290,000 pcs of picture elements (horizontal 500 x vertical 582), its scanning area is 6.6(V) x 8.8(H)mm so that the 2/3 inches optics and lens can be used.

The CCD image sensor is mounted on dual in line package with 20 pins and has an optical window in front of the Cell as shown in Fig. 1-3.

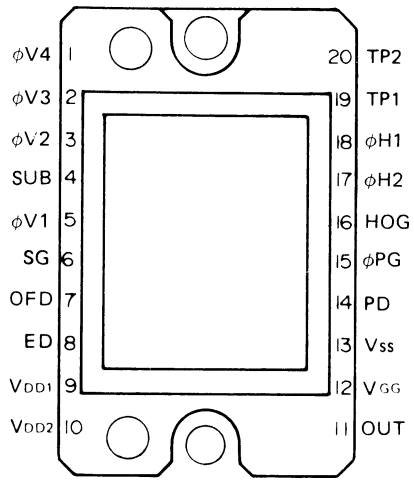


Fig. 1-3 Appearance of CCD image sensor CX021L

Table 2. Pin Identification of CXO21L

Pin No.	Pin Name	Description
1	φV4	Vertical transfer pulse in
2	φV3	Vertical transfer pulse in
3	φV2	Vertical transfer pulse in
4	SUB	Ground
5	φV1	Vertical transfer pulse in
6	SG	Sensor gate bias in
7	OFD	Anti-blooming bias in
8	ED	Edge drain bias in
9	VDD1	Power source
10	VDD2	Power source
11	OUT	Pre-video out
12	VGG	Out put amplifier gate bias in
13	VSS	Out put amplifier gate bias in
14	PD	Pre-charge drain bias in
15	φPG	Pre-charge pulse in
16	HOG	Horizontal register read-out Control bias in
17	φH2	Horizontal transfer pulse in
18	φH1	Horizontal transfer pulse in
19	TP1	Test pin-1
20	TP2	Test pin-2

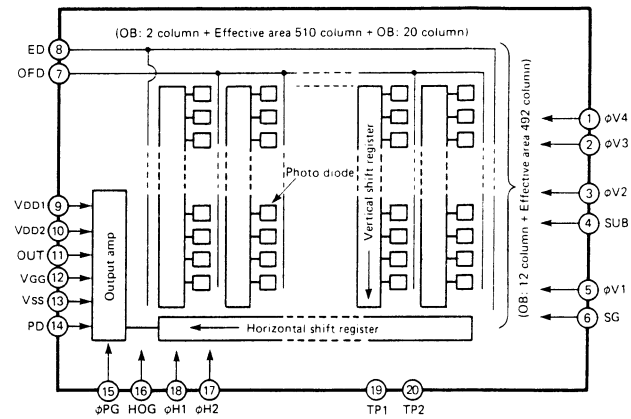


Fig. 1-4 CCD image sensor

When the incoming light reaches the photo-diode, the signal-charges are accumulated according to the intensity of light.
The accumulated signal-charges are sent to the transfer section of vertical shift register by supplying transfer pulse to read-out gate during vertical blanking periods.
The signal-charges sent to the transfer section are shifted from picture elements to picture elements by supplying transfer pulse to vertical shift register, and they are shifted to horizontal shift register.
The signal-charges are taken out from output amplifier during horizontal scanning periods.
Basic action of CCD image sensor is shown in Fig. 1-5.

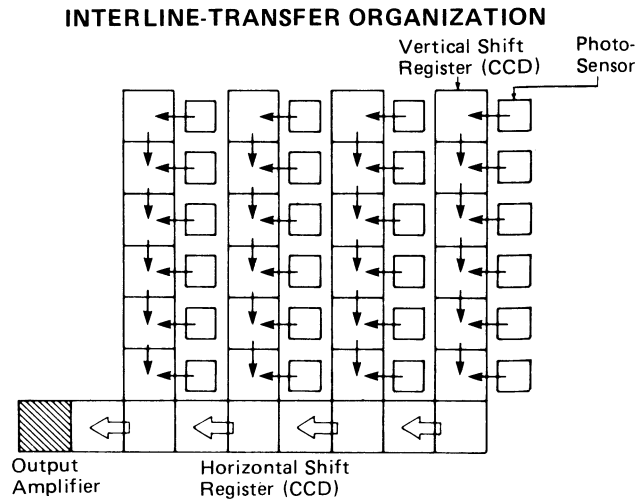
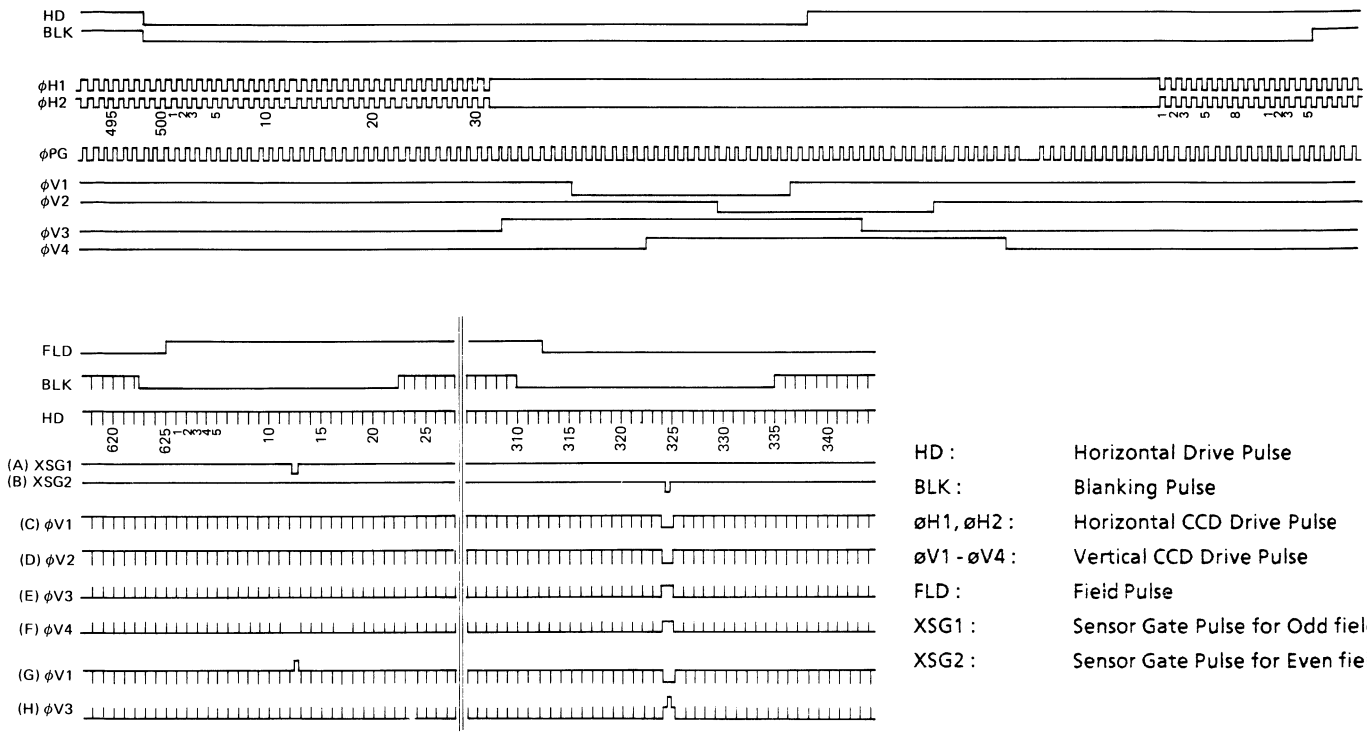


Fig. 1-5 Interline Transfer

CCD Drive Pulse Timing Chart



2. CCD Board

This board receives the pulses from the Sync board and sends these pulses to the CCD image sensor in order to take out the prevideo signal. The prevideo signal is then fed to the Process board to convert it into the video signal.

The sensor gate pulse-1 (XSG1) (A) at pin 5 of E101 is fed to inverter Q102/Q103 and the inverted pulse is sent to the Q106/Q107 power line which has high impedance.

The vertical transfer pulse-1 (C) is sent from pin 8 of E101 is fed to inverter Q106/Q107 where it is mixed with the sensor gate pulse-1. The mixed signal (G) at the collector of Q106/Q107 is sent to pin 5 of CCD image sensor IC1.

Similarly the sensor gate pulse-2 (XSG2) (B) at pin 6 of E101 sent through inverter Q104/Q105 is mixed with the vertical transfer pulse-3 (E) supplied through inverter Q108/Q109. The mixed signal (H) at the collector of Q108/Q109 is then applied to pin 2 of IC1.

The vertical transfer pulse-2 (D) and 4 (F) at ins 11 and 10 of E101 is respectively sent through inverter Q110/Q111 and Q112/Q113 to pins 3 and 1 of IC1.

The horizontal transfer pulse-1 at pin 13 of E101 is fed through inverter Q115/Q116 and buffer Q117/Q118 to pin 18 of IC1.

Similarly the horizontal transfer pulse-2 and precharge pulse are fed through inverter Q119/Q120 and buffer Q121/Q122 and inverter Q123/Q121 and buffer Q125/Q126 to pins 17 and 15 of IC1 respectively, Q101 and Q114 are power supplies.

The CCD image sensor IC1 produces the modulated prevideo signal from pin 11 through buffer Q127 and it is sent to the Power/process board.

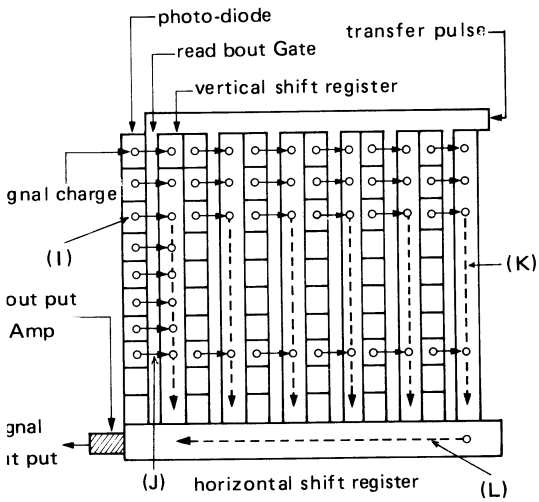
When the incoming light reaches to the photo-diode, the signal-charges are accumulated corresponding to the incoming light intensity(I).

The accumulated signal charges of the odd lines are transferred to the vertical shift register by the sensor gate pulse-1 (XSG1) multiplexed to the vertical transfer pulse-1 (øV1) supplied at pin 5 of CCD image sensor IC1 (J).

the signal-charges are shifted to the Horizontal shift register (H.CCD) every 1H period by vertical transfer pulse (øV1, øV2, øV3, øV4) (K).

The signal-charges are shifted to the output amplifier every 1V period by horizontal transfer pulse (øH1, øH2) (L).

xt, the accumulated signal charge of the even es are transferred to vertical shift register by ɜ sensor gate pulse-2 (XSG2) multiplexed to ɜ vertical transfer pulse-3 (øV3) supplied at ı 2 of IC1.
e signal-cahrges are shifted to the horizontal ft register (H.CCD) every 1H period by vertical ınsfer pulse (øV1, øV2, øV3, øV4).
e signal-charges are shifted to the output ıplifier every 1H period by horizontal transfer lse (øH1, øH2).



ȝ. 2-2 Schematic Diagram of CCD image snsor CX021L

Process Board

ıis board contains the sample hold circuit and ȝnal processing circuit.

1 Sample Hold Circuit

ıis circuit receives the modulated prevideo ȝnal from the CCD image sensor on the CCD ›ard, and eliminates pulse and noise and ɜnerates a video signal.
ıe modulated prevideo signal (A) is fed from e CCD image sensor through pin 9 of IC201 to mple hold circuits inside IC201 where the ȝnal with the precharge component on the ȝnal (A) is detected and held by the data mple hold pulse (B) sent through pin 12 of 201 and buffer and the signal (D) is obtained pin 5 of IC201.

The signal (D) is then supplied through buffer Q202 to inverted input of mixer inside IC201.
The precharge component on the signal (A) sent to sample hold circuit is detected and hold by the precahrge sample hold pulse (C) fed through pin 11 of IC201 and buffer and the precharge component (E) is detected. The precharge component (E) is then sent through pin 7 of IC201 and buffer Q203 to another sample hold circuit inside IC201.
The signal (E) is sampling by the data sample-hold pulse (B) sent through pin 12 of IC201.
The noise which generated after date sample hold are excluded after precharge sample hold is on the precharge component (F).
Where is subtracted from the signal with precharge component (D). As a result, only the video signal (G) excluding the precharge component is detected and obtained at pin 15 of IC201, and then send to signal processing circuit.

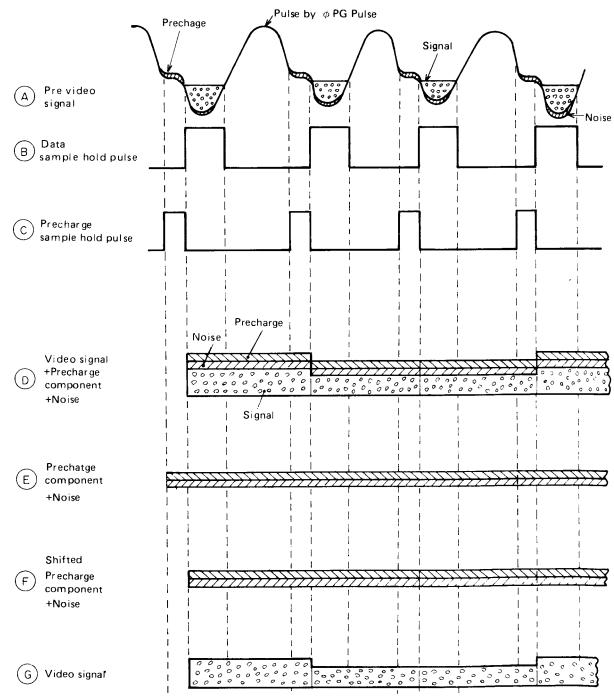


Fig. 3-1 Waveform of Sample hold circuit

3-2 Signal Processing Circuit

3-2-1 Gain Control Circuit

The prevideo signal from sample hold circuit is fed to base of Q204 and base of Q206 respectively.

The amplified video signal obtained at collector of Q206 is mixed with CP1/HD pulse and then send out to automatic iris control lens to control lens iris.

Transistors Q204 and Q205 amplify prevideo signal controlled by VR204 (INPUT GAIN) and amplified prevideo signal obtained at emitter of Q205 is fed to pin 5 of IC202 through buffer Q208 and pulse noise trap CF201.

3-2-2 Optical Black (OB) Clamp Circuit

The gain controlled prevideo signal is supplied through pin 5 of IC202 to optical black (OB) clamp circuit inside IC202. The optical black (OB) places at the end of horizontal scanning area on the face plate of CCD image sensor which cut off the incoming light. When the CCD image sensor reads out the signal on the OB portion (A), the dark current of the CCD image sensor is produced and this signal portion (B) is clamped to a fixed DC potential, so that the black level is sensed.

In other words, the dark current level (B) of the prevideo signal (B) supplied to the clamp circuit inside IC202 is clamped by the clamp pulse-1 (CP1) (C) separated from the multiplexed signal to CP1 and HD pulses inside IC202.

The multiplexed signal of CP1 and HD pulses are generated and mixed in the sync generator circuit on the Sync board, and then they are fed to the pulse separator inside IC202 where they are separated.

The clamped video signal is mixed with the HD pulse from the pulse separator and the noise during the blanking period is removed.

The mixed signal is fed to the gamma (γ) correction circuit.

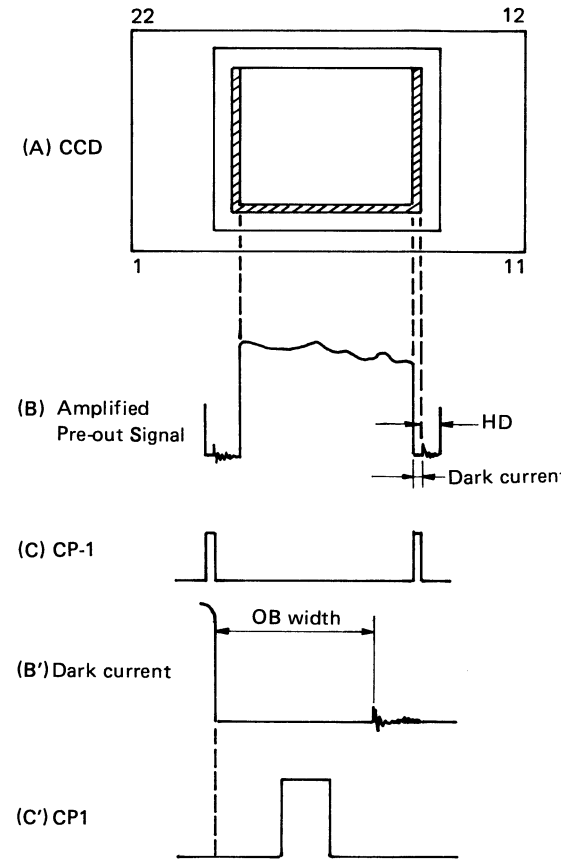


Fig. 3-2 OB Clamp Circuit

3-2-3 Gamma Correction Circuit

The prevideo signal is fed to the gamma (γ) correction circuit where the prevideo signal is corrected to the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and this circuit reproduces a linear picture of high fidelity on the monitor.

In order for a televised picture to have the same contrast gradation as the original scene, the gamma of the system (including the CCD image sensor, signal processing inside camera and monitor) must be equal to 1.

The gamma characteristic of CCD image sensor is approx. 1 and the gamma characteristic of the monitor is approx. 2.2, so that the gamma characteristic of the gamma correction circuit should be approx. 0.45, which makes the total gamma to be approx. 1 as shown in Fig. 3-3.

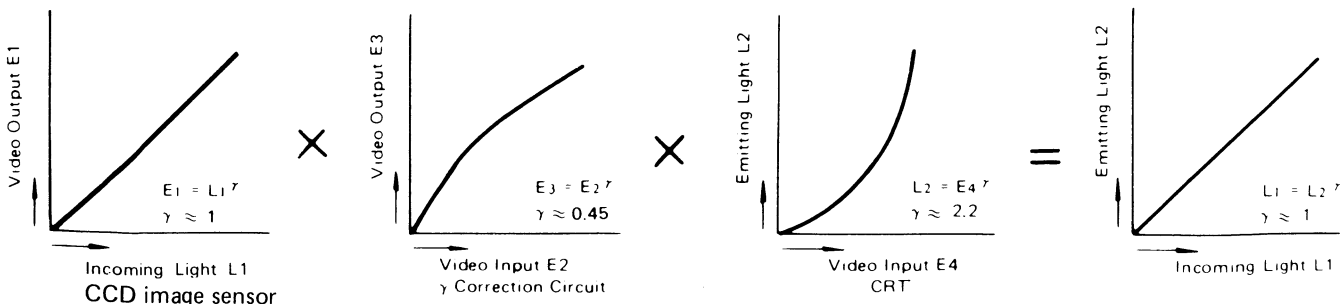


Fig. 3-3 Gamma Correction

3-2-4 Automatic Gain Control Circuit

The video signal from the gamma correction circuit in IC202 is fed through the AGC amplifier and amplifier to pin 8 of IC202. The video signal is then applied to the AGC detect circuit where the video signal is modulated by the HD pulse from the pulse separator and the modulated video signal is made for detecting signal level corresponding to the center image.

The modulated video signal is peakrectified in the AGC detect circuit and converted into DC voltage corresponding to the video signal level i.e., the incoming light intensity.

This DC voltage is then fed through pins 17 and 16 of IC202 to the AGC control circuit where it is compared with the reference DC voltage. The error between the DC voltages is fed through pin 7 of IC202 to the AGC amplifier to control its gain.

When the camera is used in the normally illuminated scene, the signal level is maintained constant by automatically iris adjusted lens. Therefore the gain of AGC amplifier does not change. However, when the camera is aimed at the weakly illuminated scene and lens iris becomes wide open, the video signal level is decreased. The decreased video signal level is detected by the AGC detection circuit and converted into the DC voltage. This DC voltage is fed through the AGC control circuit to the AGC amplifier to control the gain of amplifier.

In this way, the signal level corresponding to normal and relatively high illumination is kept constant by the lens iris opening, while the signal level corresponding to relatively low illumination is controlled by the AGC circuit.

VR203 (AGC SET) sets the gain of the amplifier at the standard light intensity in the automatic gain control mode.

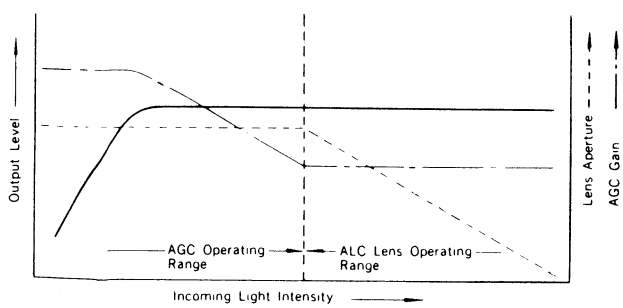


Fig. 3-4 AGC Opoeration

3-2-5 Horizontal Aperture Signal Generator Circuit

The gain controlled video signal having high frequency response is obtained at pin 9 of IC202, and mixed with camera number character which is generated in the Sync board. Then this video signal is fed to H.aperture generator circuit.

When the camera is aimed at an object (A) for example, the signal (B) passed through pin 1 of IC203, signal (C) delayed 0.15μs by delay line CF203 and amplified in the H.aperture generator circuit and signal (D) which results from the delayed video signal being reflected back through CF203 and delayed again (0.3μs) appear at the output of the H.aperture generator circuit where they are mixed in fixed proportions to make up the H.aperture signal (E).

The H.aperture signal obtained in this way is applied through pin 23 of IC203, noise clipper of D202 and D203 and pin 4 of IC203, where the noise mixed in the H.aperture signal (F) is removed (G).

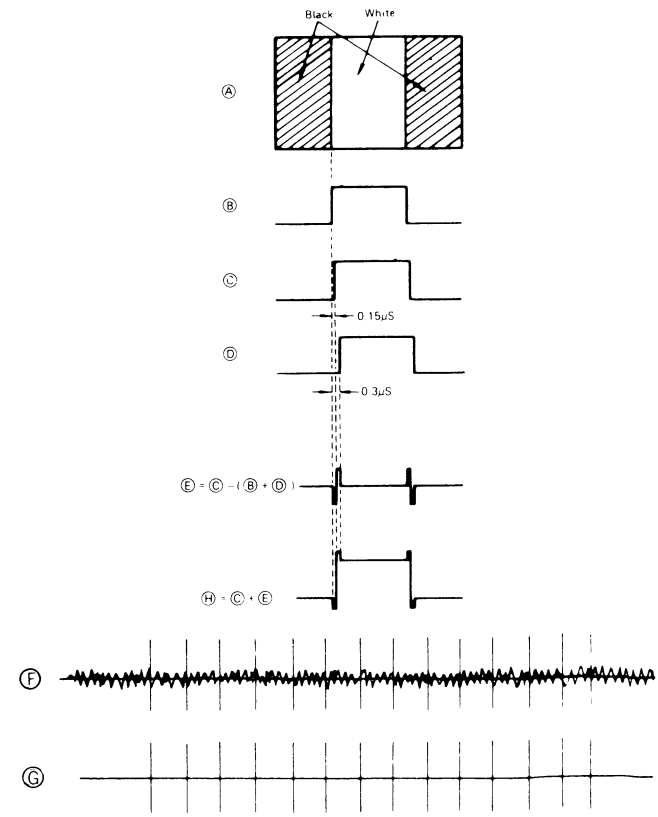


Fig. 3-5 Horizontal Aperture Signal

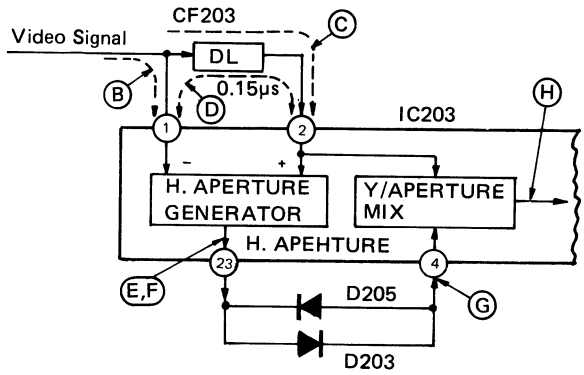


Fig. 3-6 Horizontal Aperture Signal Generator Circuit

3-2-6 Video Signal Processing Circuit

The horizontal aperture signal (A) from H. aperture circuit and video signal (B) is obtained at pin 4 of IC203 and pin 2 of IC3 respectively and those signals are mixed in the mixing circuit in the IC203.

The mixed signal (C) is forwarded through pins 6 and 7 of IC203 to clamp circuit where the blanking level of the mixed signal is clamped by clamp pulse-2 (CP2) supplied from pulse separator inside IC203.

The clamped video signal is then sent to the BL mix/high clip/low clip circuit, where it is mixed with the blanking pulse (D). The high clip circuit clips the high level signal and the low clip circuit clips the low level portion of mixed signal (D) for setting the pedestal level (E).

The mixed signal of H.aperture and video signal (E) which undergoes the high and low clip and is mixed with the sync signal (F) through pin 12 of IC203 in the video output circuit forming a composite video signal (G). The video signal at pin 13 of IC203 is supplied to video monitor through the Mother board, video output connector and connected coaxial cable.

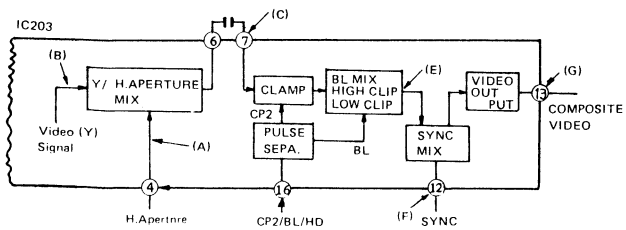


Fig. 3-7 Video Signal Processing Circuit

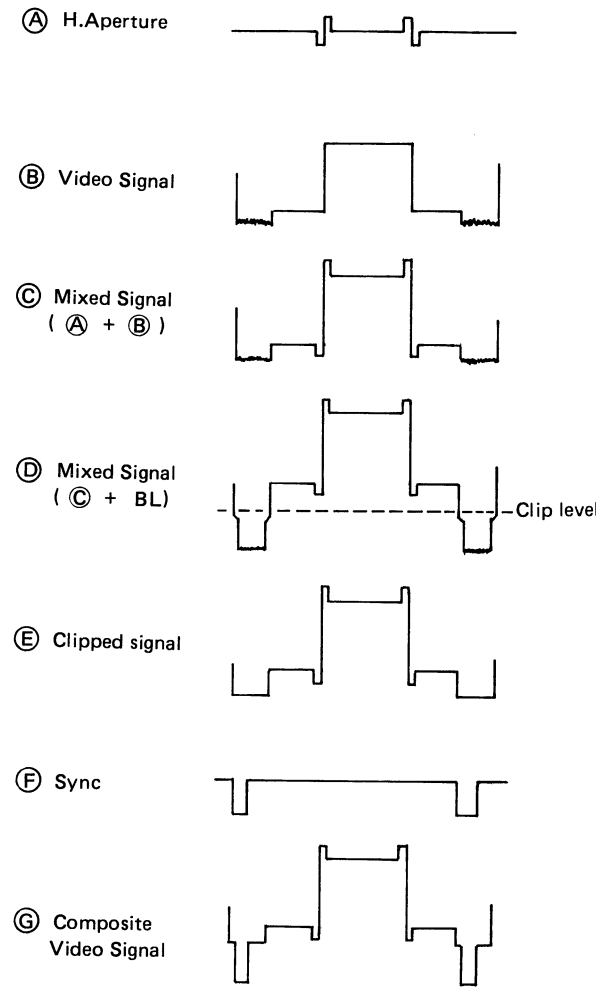


Fig. 3-8 Vido Signal

4. Sync Board

This board contains following circuit.

4-1. Sync Generator Circuit
4-2. CCD Drive Pulse Generator Circuit
4-3. Camera Number Generator Circuit

4-1-1 Internal Sync Generator Circuit

This circuit generates the pulses necessary to produce the video signals when no external pulses (horizontal and vertical drive pulse or composite video signal) are fed to the camera.

When no external pulses are fed to external HD/VS and VD connector, pins 7 ((HDC), 9 (VDC) and 12 (COMP) of sync generator IC104 are received high level from IC103.
Also pin 11 of switching IC107 receives low level from IC103 and then switch inside of IC107 is connected to pin 12.
As a result, IC104 and this sync generator circuit is set to internal sync generator mode.
IC110 receives 14MHz signal from IC105 and it generates reset pulse for IC103.
The crystal oscillator consisting of X101, C105, C106, R104 and R105 oscillates 31.25KHz and it is fed to pin 4 of IC104.
The voltage controlled oscillator (VCO) which consists of IC102 (b),D101, C108 - C111, R107, R108 and CT101 are oscillated approx. 28MHz by phase comparator output from pins 26 and 27 of IC104 through IC107 to gate of Q101.
Then the 28MHz signal is fed to pin 39 of IC103 through inverter IC102 (a) and (b), and 28MHz signal is counted down to 4MHz inside of IC103, and this 4MHz obtained at pin 38 of IC103 is sent to pin 25 of IC104.
CT101 (H.LOCK) is a control to set self-oscillating frequency of VCO in the internal sync mode.
IC104 generates the following pulses.

Pin 13	VD	(Vertical Drive Pulse)
Pin 14	DVD	(Delayed Vertical Drive Pulse)
Pin 16	BL	(Composite Blanking Pulse)
Pin 20	C.SYNC	(Composite Sync Pulse)
Pin 22	HD	(Horizontal Drive Pulse)

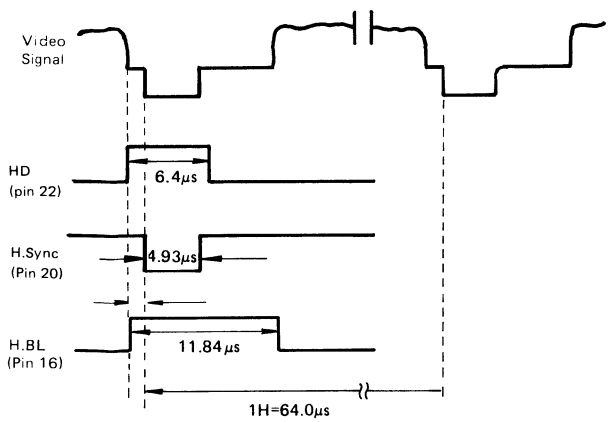


Fig. 4-1 Pulses

4-1-2 External Sync Generator Circuit

When the HD pulse supplied from CN4 (HD IN) is sent through amplifier Q106 and Q107 and inverter IC108 (c) to pin 2 of IC103. And the VD pulse supplied from CN3 (VD IN) is sent through amplifier Q108 and inverter IC108 (d) and (e) to pin 3 of IC103.
The external HD and VD pulses obtained at pins 20 and 16 of IC103 are sent to pins 8 and 10 of IC104.
The low level obtained at pins 21 (H.DC and V. DC) and 17 (H.DC and V.DC) of IC103 are sent to pins 7 and 9 of IC104.
The high level obtained at pin 15 (COMP) of IC103 is sent to pin 11 of IC104.
The low level obtained at pin 10 (PLL) of IC103 is sent to pin 12 of switching IC107.
As a result, the sync pulses at the external (HD/VD) sync mode are generated.
When the V.S signal supplied from CN4 (V.S IN), the low level obtained at pin 15 (COMP) of IC103 is sent to pin 12 of IC104.
As a result, the sync pulses at the external (V.S) sync mode are generated.
The external horizontal pulse at pin 8 of IC104 and crystal oscillator input at pin 4 of IC104 are phase-compared inside of IC104, and then phase-compared output at pins 26 and 27 are converted into the DC voltage by the active low pass filter consisting of C113 and R113. The DC voltage is sent through IC107 to voltage control oscillator (VCO) consisting of IC102 (b), D101, C108 - C111, R107, R108 and CT101 (H.LOCK) to control the its oscillating frequency changing the capacitance of variable capacitance diode D101.
The oscillated approximately 28MHz signal is sent through inverter IC102 (a) and (d) to pin 39 of IC103 and 1/7 counted down signal approximately 4MHz obtained at pin 38 of IC103 is sent to pin 25 of IC104.
In other word, the IC104 oscillates pulses synchronized with the externally supplied HD pulse.
The external vertical pulse is fed to pin 10 of IC104 and IC104 oscillates pulses synchronized with externally supplied VD pulse.

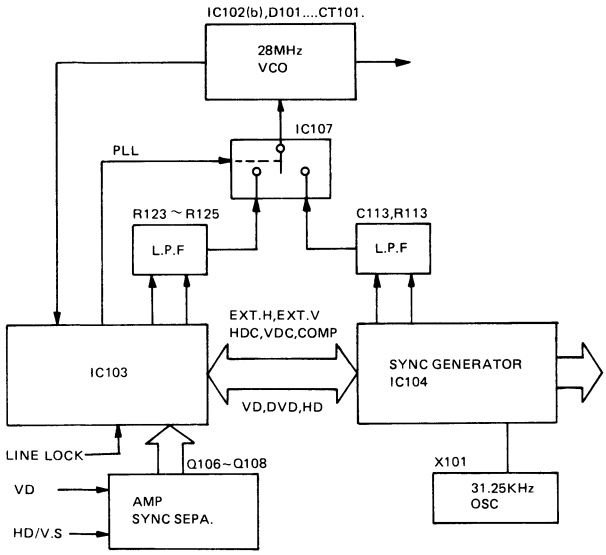


Fig. 4-2

4-1-3 Line Lock Circuit

When the sync selector switch on the rear of camera (WV-CD20, WV-CD24) set to "LL" (line lock) position, pin 5 of IC103 receives high level and IC103 turns to line lock mode.

The IC103 receives 50Hz vertical pulse from power board at pin 4 and VD pulse at pin 14 respectively.

These pulses are phase-compared inside of IC103 and phase-compared output at pins 11 and 12 of IC103 are sent through active low pass filter consisting of R123 - R125 convert it to DC voltage and switching IC107 to 28MHz voltage control oscillator (VCO).

As a result, the pulses generated IC104 are synchronized with the connected main power line (50Hz).

4-2. CCD Drive Pulse Generator

This circuit receives clock pulse of approximately 28MHz, horizontal drive pulse (HD) and field pulse (FLD) from the sync generator circuit and generates the pulses to drive the CCD image sensor.

The clock pulse (CLK), the HD pulse and field pulse (FLD) are respectively fed to pins 30, 35 and 34 of IC105 and the following pulses are generated from IC105.

Pin 2	(SHD)	Data sample hold pulse
Pin 3	(SHP)	Precharge sample hold pulse
Pin 4	(øV4)	Vertical transfer pulse-4
Pin 5	(øV2)	Vertical transfer pulse-2
Pin 8	(øV3)	Vertical transfer pulse-3
Pin 9	(øV1)	Vertical transfer pulse-1
Pin 10	(XSG2)	Sensor gate pulse-1
Pin 11	(XSG1)	Sensor gate pulse-2
Pin 12	(XPG)	Precharge pulse
Pin 13	(øH2)	Horizontal transfer pulse-2
Pin 14	(øH1)	Horizontal transfer pulse-1
Pin 36	(CL)	14MHz clock pulse
Pin 41	(CP2)	Clamp pulse-2
Pin 42	(CP1)	Clamp pulse-1

These pulses are sent to CCD board and Process board.

IC106 is a ROM IC used for the compensation of spot/blemish on the CCD image sensor. The position of spots/blemishes is memorized in the IC106 and this information is sent to the IC105. In IC105, the data sample hold pulse and precharge sample hold pulse which coincide with the position of the spots/blemishes are not generated. Therefore, the spots/blemishes are skipped from the sampling, i.e., the spots/blemishes are not detected and not displayed.

Note : IC106 does not comes with the CCD image sensor which has no spots/blemishes.

4-3. Camera Number Generator Circuit

This circuit generates 0 - 99 camera number character and send it to the Process board.

The address generator circuit, data select circuit and data output circuit inside of IC103 is received delayed vertical pulse (DVD) at pin 13 and data inputs at pins 29, 30, 32 - 36 of IC103.

The data and address output obtained at pins 25 - 28 of IC103 are fed alternately to pins 3 - 6 of character generator IC101.

The character generator IC101 also receives vertical drive (VD) pulse at pin 2 (LDI) for input data and address control, horizontal drive (HD) pulse and delayed vertical drive (DVD) pulse at pins 12 and 15 for character position.

The character obtained at pin 7 of IC103 is sent to Process board and mixed with video signal.

The SW101 (1st place digit) and the SW102 (2nd place digit) are set the camera number character.

The SW3 (Camera number ON/OFF) is controlled ON and OFF camera number character.

5. Power Board

This circuit contains the +5V and +9V DC regulator circuit, +20V and -5V DC regulator circuit and line lock circuit.

5-1. +5V and +9V DC Regulator Circuit

This +5V and +9V DC regulator circuit is a switching type regulator.
The +5V DC regulator circuit consisting of IC301, Q301, D301d and L302 receives unregualted +12V DC from AC-DC board at emitter of Q301 and pin 1 of IC103 respectively.
The switching pulse generated inside of IC301 is applied from pin 5 of IC301 to the base of switching transistor Q301 switching ON and OFF.
As a result, the DC voltage whose level is set by the switching pulse width (pulse duty) is obtained at the output of the switching regulator circuit consisting of Q301, D301, L302.
The generated DC voltage is fed back to pins 2, 3 and 4 of IC301 to maintain constant output voltage.
The regulated +5V is then supplied to other circuits as a power through the filter consisting of L303 and C303.
The +9V DC regulator circuit consisting of IC301, Q302, D302 and L304 is similar to +5V regulator circuit.

5-2. +20V and -5V Regulator Circuit

This circuit generates +20V and -5V DC.
The horizontal drive (HD) pulse generated in the sync circuit is supplied through amplifier Q303 - Q305 and converter transe driver Q304 to primary winding of transeformer T301 to step up the horizontal drive pulse to necessary level.
The boosted pulses obtained at the secondary winding of T301 are rectified by D303 and D305 to generate +20V and -5V respectively.
The +20V obtained by rectifying the boosted pulse with D303 is supplied to +20V regulator IC302 and +20V is then supplied to CCD board.
The -5V obtained by rectifying the boosted pulse with D305 is supplied to -5V regulator IC303 and -5V is then supplied to CCD board.

5-3. Line Lock Circuit

This circuit consisting of VR301 (V.PHASE), C322 and IC311, IC312 on the Sub-power board receives line pulse (50Hz) from AC-DC board and generates line lock V.pulse.
The line pulse is fed from AC-DC board (WV-CD20 and WV-CD24 only) through inverter IC311 to pin 12 of monostable multivibrator IC312.
When the sync selector switch on the rear of camera is turned to "LL" position, the phase controlled line lock V.pulse obtained at pin 9 of IC312 and this pulse is sent to sync generator circuit.
At the same time, internal/line lock control signal (+5V) is supplied through this circuit to sync generator circuit.

6. AC-DC Boards (WV-CD20, WV-CD24 only)

This circuit receives main power 120V AC 50Hz and generates +12V DC and line pulse (50Hz).
The +12V DC is supplied to Power board for generates +5V, +9V, +20V and -5V DC.
The line pulse is supplied to Power board for generates line lock V.pulse when line lock sync mode.

ADJUSTMENT PROCEDURE

1. Test Equipmnt Required

The following test equipment is required for adjustmeent of black and white solid state camera WV-CD20/WV-CD22/WV-CD24.

- Oscilloscope (30MHz band width)
- Digital voltmter (DVM)
- Undrscanned black and white video monitor
- Lens : Automatic iris control lens such as WV-LA16B (f1.4 16mm C-mount) or fixed focal lens with iris control.
- Resolution chart (YWV1400RB99)
- Extension cable for Process board (Part No. YFVKZCD20P2A)

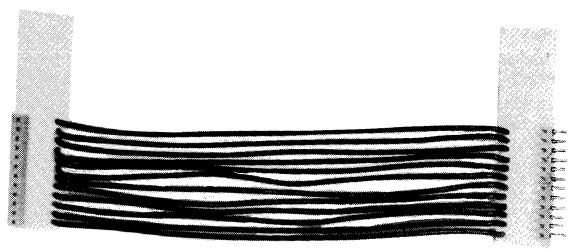


Fig. 1-1

- Extension cable for Power board (Part No. YFVKZCD20P3A)

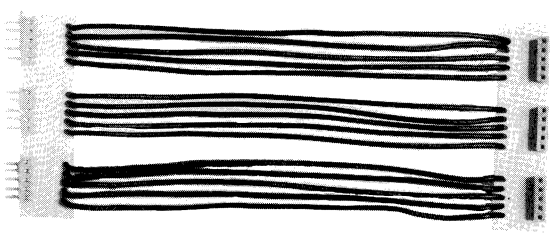


Fig. 1-2

2. Disassembling Procedure for Adjustment

- Remove two screws which hold the mounting base and remove mounting base. (Fig. 2-1)

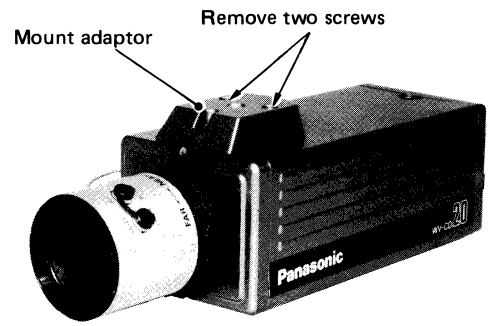


Fig. 2-1

- Remove four screws fixing the rear panl and the cover, and remove the rear panel and the cover. (Fig. 2-2)

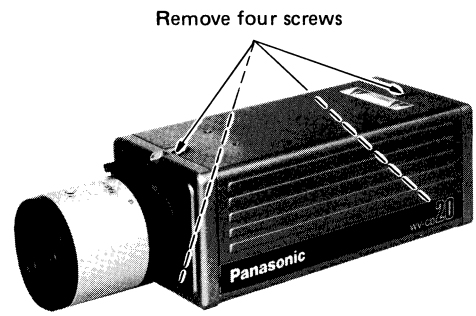


Fig. 2-2

- Remove one screw which hold the PCB hold plate and remove the PCB hold palte. (Fig. 2-3)

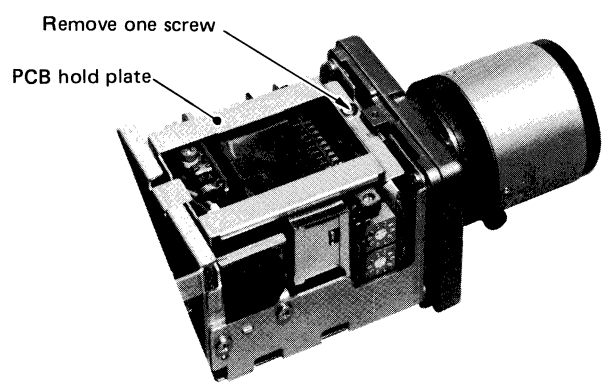


Fig. 2-3

3. CCD Image Sensor Replacement

- Disassembling the camera while referring to 2. Disassembling Procedure for Adjustment.
- Remove two screws fixing the front chassis and rear chassis and seeparate the front and rear chassis. (Fig. 3-1)

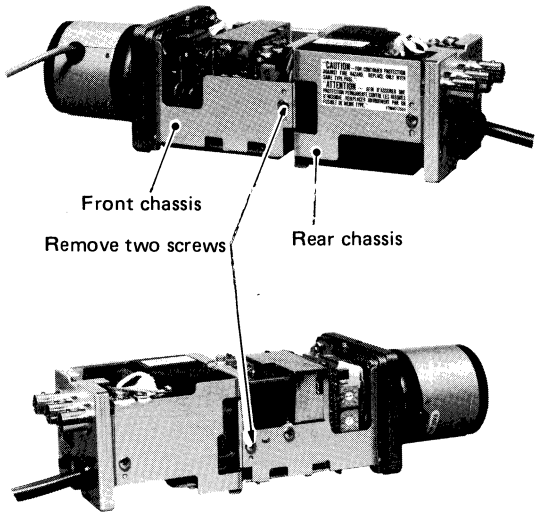


Fig. 3-1

- Remove one screw which hold the lens connector and remove lens connector from chassis. (Fig. 3-2)

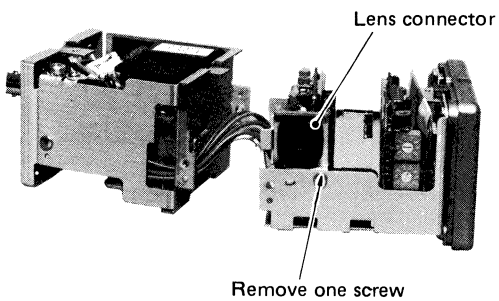


Fig. 3-2

- Disconnect the Process board from Mother board by pulling it upwards. (Fig. 3-3)

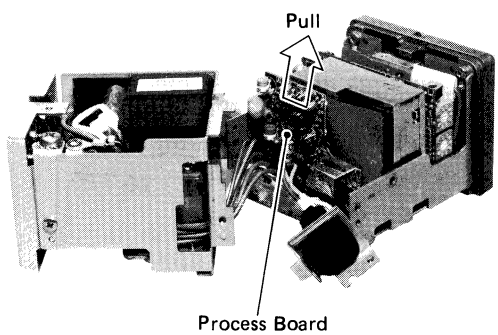


Fig. 3-3

- Remove two screws which hold the Mother board and remove Mother board from chassis. (Fig. 3-4)

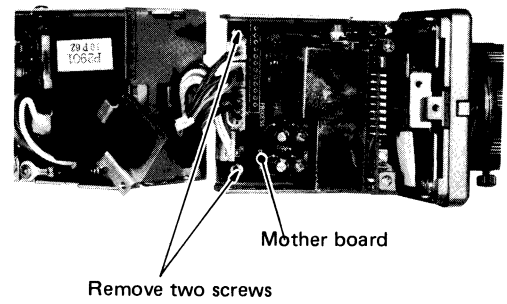


Fig. 3-4

- Remove the CCD board from the front panel (CCD image sensor) by pulling it backward. (Fig. 3-5)

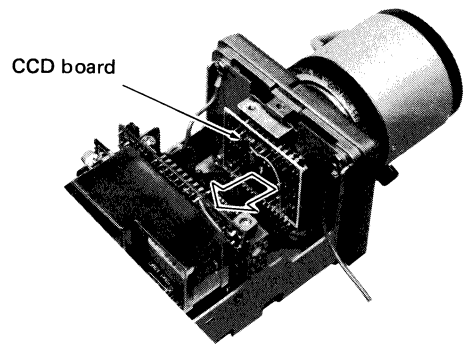


Fig. 3-5

- Remove two screws fixing the CCD image sensor and remove the CCD image sensor. (Fig. 3-6)

  CAUTION : Do not drop the IR (Infrared) cut filter assembly during removing the CCD image sensor.

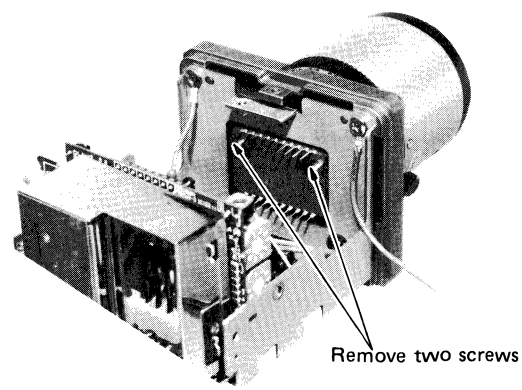


Fig. 3-6

- Reinstall the new CCD image sensor to the socket of the CCD image sensor on the CCD board for align the CCD image sensor pins and socket.
- Remove the new CCD image sensor from the socket.
- Reinstall the new CCD image sensor to the front panel by fixing two screws.
- After replacing the CCD image sensor, reinstall the camera in reverse order of disassembly procedure.

  Note : (1) Make sure that no dust on CCD image sensor glass surface or filters.

  (2) IC106 (MB7052PF) on Sync board is used to compensate the spots/blemishes of the CCD image sensor.
  IC106 (MB7052PF) does not comes with the CCD image sensor which has no spots/blemishes. When replacing the CCD image sensor, refer to the instructions below.

Replacement Parts \ Camera	CCD image sensor without IC106 on CCD drive board	CCD image sensor with IC106 on CCD drice board
CCD image sensor without IC106	Just replace CCD image sensor replace CCD image sensor	Replace CCD image sensor and remove IC106
CCD image sensor with IC106	Replace CCD image sensor and place IC106	Replace CCD image sensor and IC106

* CCD image sensor and IC106 must be used pair.

4. IR Cut Filter Removal

Note : The IR cut filter can be removed from the camera and the camera can be used without IR cut filter for certain object or purpose.

- Remove the lens from the camera.
- Turn the IR cut filter holding screw and remove it from camera. (Fig. 4-1)
- Remove IR cut filter from the camera.
- Reinstall the IR cut filter holding screw and tighten it.

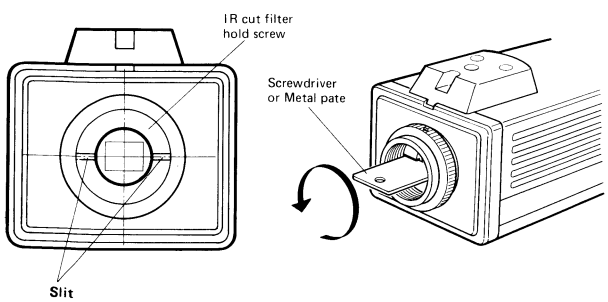


Fig. 4-1

5. Connection and Setting Up for Adjustment

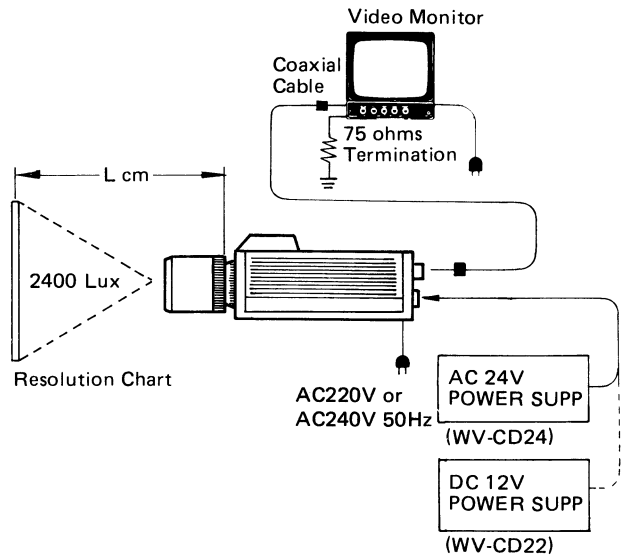


Fig. 5-1

Connection

- Connect the coaxial cable between the video output connector and the underscanned black and white monitor.
- Terminate the video input of monitor with 75ohms.
- Position the resolution chart (YWV1400RB99) in front of the camera as shown in Fig. 5-1.
- Connect the DC 12V power supply for WV-CD22.
- Connect the AC 24V power supply for WV-CD24.
- Set the sync select switch on the rear of WV-CD20 and WV-CD24 to INT/EXT position.

6. Adjustment Procedure

- Refer to page 24 for the position of test points and adjusting controls.

(1) H.Lock adjustment

Test point:	TP3(H.LOCK)	Sync board
Adjust:	CT101(H.LOCK)	Sync board

- Connect the digital voltmeter to TP3 on the Sync board.
- Adjust CT101 (H.LOCK) for + 2.2 ± 0.1V.

(2) HD pulse phase adjustment

Test points:	TP1(HD)	Sync board
	TP2(14MHz)	Sync board
Adjust:	VR101 (HD PHASE)	Sync board

- Connect the oscilloscope to TP1 (HD) and TP2 (14MHz) on the Sync board.
- Trigger the oscilloscope at H.rate. (Use TP1 (HD) on the Sync board.)
- Adjust VR101 (HD. PHASE) so that the rising edge of 14MHz pulse is delayed 10 nsec from decay timing edge of HD pulse. (Fig. 6-1)

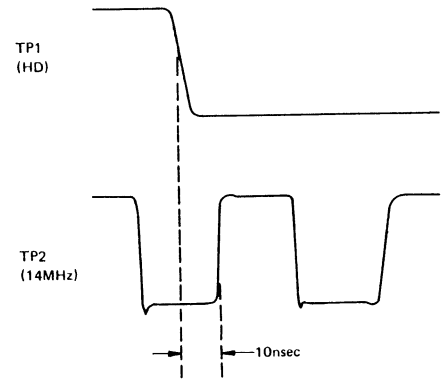


Fig. 6-1

(3) Flange focal length adjustment

Adjust:	Flange adjusting ring
Observe:	Black and white monitor

- Aim the camera at an object which is illuminated approx. 50 lux and further than 10 meters.
- Set the lens focus ring to ∞ position.
- Loosen the two hex screws on the flange adjusting ring by using the supplied hex-wrench. (Fig. 6-2)
- Turn the flange adjusting ring by using the supplied hex-wrench to the best focus position.
- Tighten the two hex screws on the flange adjusting ring by using supplied hex-wrench.

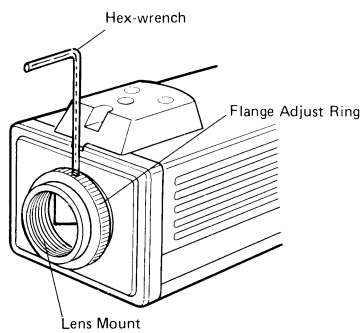


Fig. 6-2

(4) Automatic iris level adjustment

Test point:	TP201 (CCD VIDEO)	Process board
Adjust:	Level adjustment VR on the lens	

- Aim the camera at the resolution chart.
- Connect the oscilloscope to TP201 (CCD VIDEO) on the Process board.
- Trigger the oscilloscope at H.rate. (Use TP1 (HD) on the Sync board.)
- Adjust level adjustment VR (LEVEL) on the lens so that the bottom level of video signal becomes 200mV ± 20mV. (Fig. 6-3)

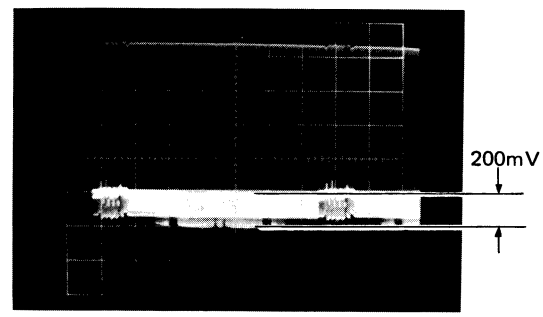


Fig. 6-3

(5) Input gain adjustment

Test point:	TP202 (PRE VIDEO)	Process board
Adjust:	VR204 (INPUT GAIN)	Process board

- Aim the camera at the resolution chart.
- Connect the oscilloscope to TP202 (PRE VIDEO) on the Process board.
- Trigger the oscilloscope at H.rate. (Use TP1 (HD) on the Sync board.)
- Adjust VR204 (INPUT GAIN) so that the white peak level becomes 300mV ± 10mV. (Fig. 6-4)

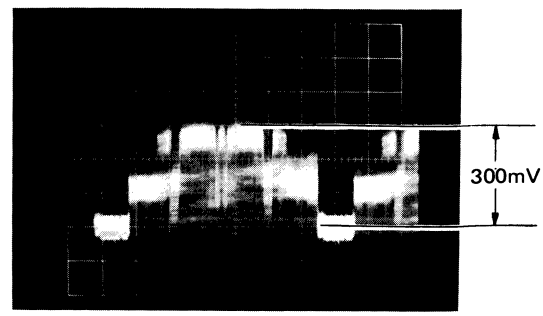


Fig. 6-4

(6) Pedestal level adjustment

Test point:	VIDEO output	Rear of camera
Adjust:	VR202 (PEDESTAL)	Process board

- Cap on the lens.
- Connect the oscilloscope to the Video output connector on the rear of the camera.
- Trigger the oscilloscope at H.rate. (Use TP1 (HD) on the sync board.)
- Adjust VR202 (PEDESTAL) so that the pedestal level of video signal becomes 0 V. (Fig. 6-5)

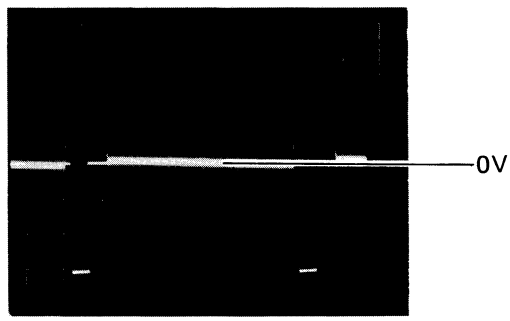


Fig. 6-5

(7) Video signal level adjustment

Test point:	VIDEO output
Adjust:	VR203(AGC SET)

- Aim the camera at the resolution chart.
- Connect the oscilloscope to Video output connector on the rear of the camera.
- Trigger the oscilloscope at H.rate. (Use TP1 (HD) on the Sync board.)
- Adjust VR203 (AGC SET) so that the blanking level to peak white level becomes 0.7 ± 0.03Vp-p. (Fig. 6-6)

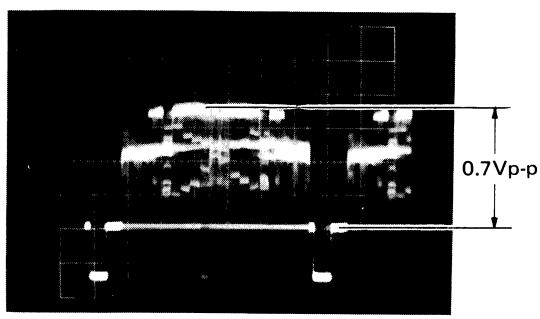


Fig. 6-6

(8) Line-lock vertical phase adjustment

Test points:	TP203(VIDEO)	Process board
	Power line	
Adjust:	VR301 (V.PHASE)	Power board

- Connect the oscilloscope to TP203 (VIDEO) on the Process board and power line.
- Set the trigger of oscilloscope to the LINE position.
- Adjust VR301 (V.PHASE) on the Power board so that the leading edge of sync signal is delayed three horizontal period (3H) from zero-cross point of power line waveform. (Fig. 6-7)

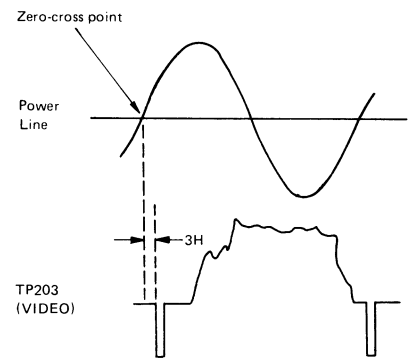


Fig. 6-7

CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.

Transistor Number

Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

Example

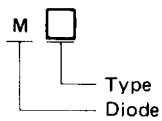
WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

Appearance and Symbols

	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

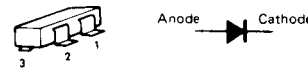
The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

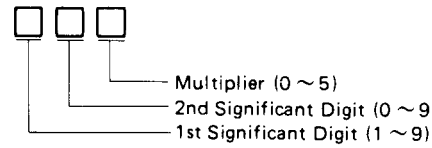
Appearance and Symbols



	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 ⟶ 33×10^0 = 33 ohms
561 ⟶ 56×10^1 = 560 ohms
123 ⟶ 12×10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

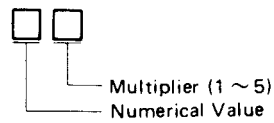
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 ⟶ 0.5 pF 2.5 ⟶ 2.5 pF
75 ⟶ 0.75 pF 33 ⟶ 33 pF
1 ⟶ 1 pF 82 ⟶ 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used

EXAMPLE:

A1 ⟶ $10 \times 10^1 = 100$ pF

N2 ⟶ $33 \times 10^2 = 3300$ pF

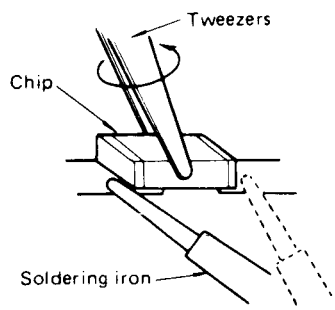
S3 ⟶ $47 \times 10^3 = 47000$ pF

5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

5-1 Removal (Transistor, Diode, Resistor and Capacitor)

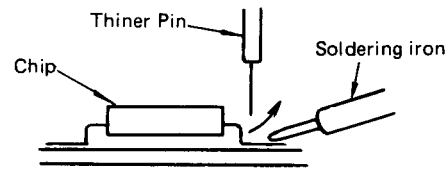
1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
   Note Be careful not to damage other chips.



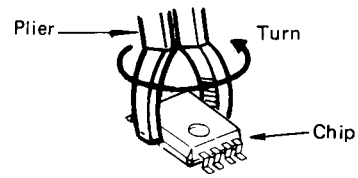
5-2 Removal (IC)

1. Add the solder wick and solder iron to each lead of the IC and remove solder.

2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.

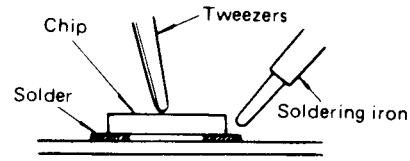


3. Remove IC turning it with plier.

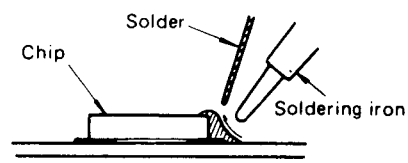


5-3 Mounting

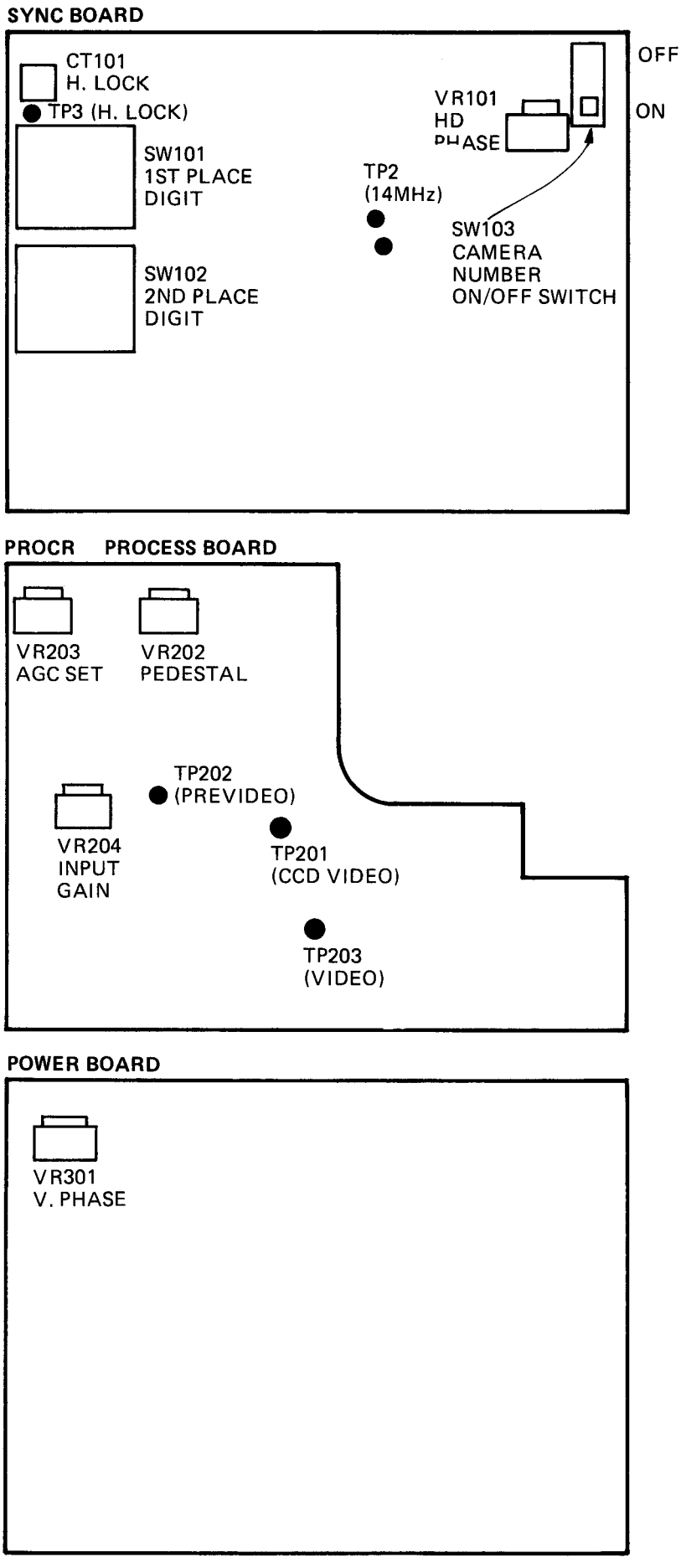
1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.



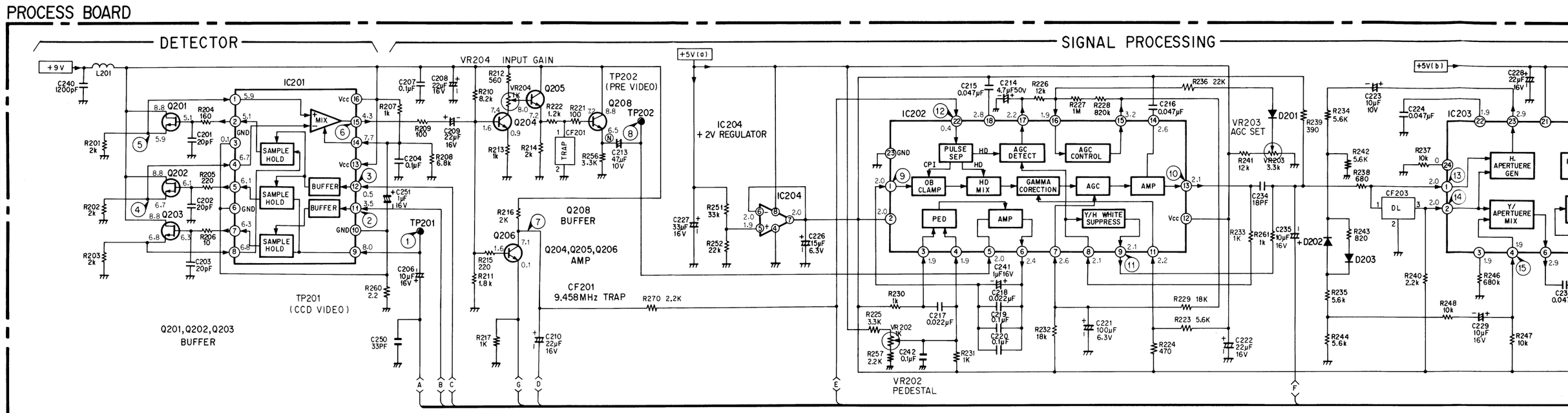
3. Solder both ends of chip (three leads for chip transistor)

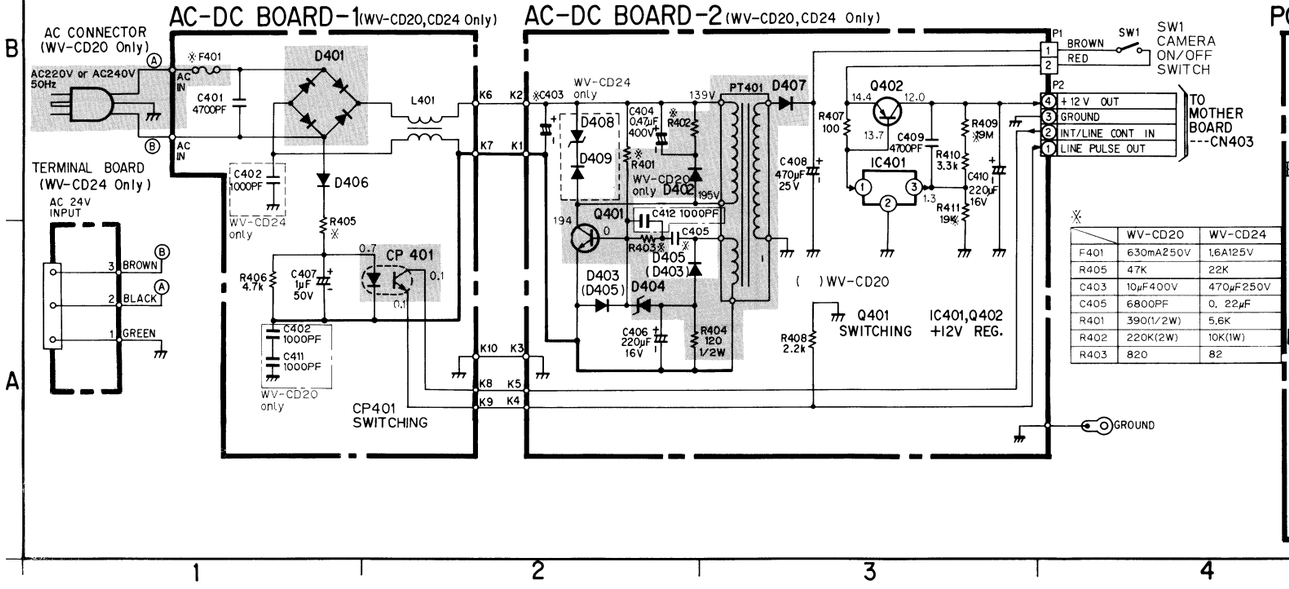


LOCATION OF TEST POINTS AND ADJUSTING CONTROLS



SCHEMATIC DIAGRAM OF PROCESS BOARD/POWER BOARD/AC-DC BOARDS





PRODUCT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

PROCESS BOARD

IC201	YFCX10045	C2,D2
IC202	AN2110S	C5,C6
IC203	AN2210SA	C7,C8
IC204	NJM4556M	C4
Q201	2SK321-Q	D1
Q202	2SK321-Q	C1
Q203	2SK321-Q	C1
Q204	2SC2404-CD	D3
Q205	2SC2404-CD	D3
Q206	2SD601-Q	C3
Q208	2SC2404-CD	D3
D201	MA151A	D6
D202	0A91	C7
D203	0A91	C7

LED BOARD

D250	LN238RPH	C3

POWER BOARD

IC301	YFSR8201	A5
IC302	NJM78L20A	A8,B8
IC303	NJM79L05A	A8
Q301	2SB819	A5,B5
Q302	2SB819	A5,B5
Q303	2SD601-Q	A6,A7
Q304	2SD1081L-BC	A7
Q305	2SC2404-CD	A6
Q306	2SA1022-C	A6
D301	SS1.5J4	A5
D302	SS1.5J4	A5
D303	SS1.5J4	B7
D304	MA151WK	A7
D305	SS1.5J4	A7
D311	MA151K	B9

SUBPOWER BOARD

IC311	MN4069BS	B8
IC312	MN4528BS	A8

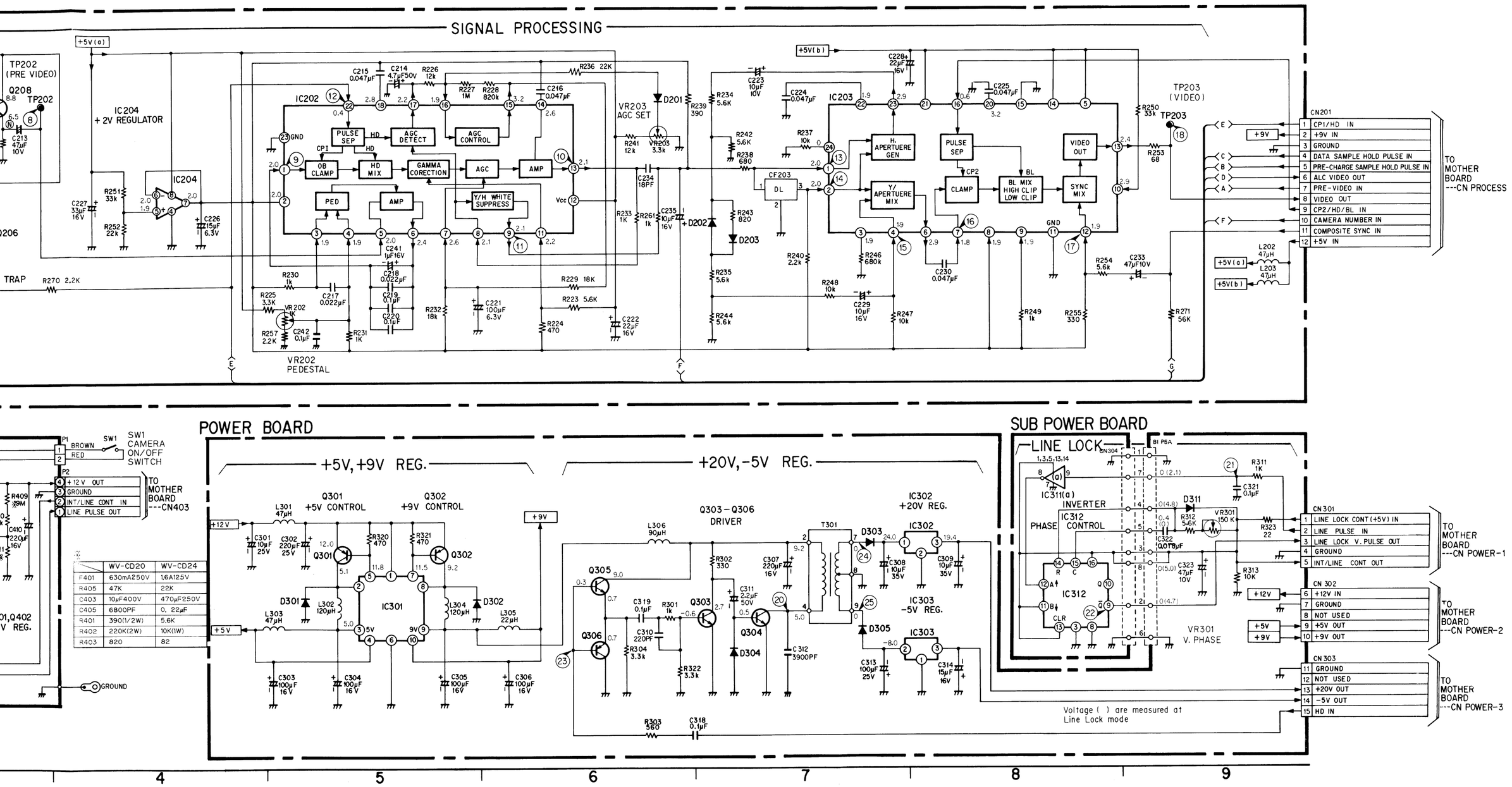
AC-CD BOARD-2

IC401	M5237L	B3
Q401	2SC3549	A2
Q402	2SB744	B3
D402	RU1P	B2
D403	1SS55	A2
D404	RD6.2EB2	A2
D405	1SS55	A2
D407	ERA81-004	B3
D408	1SS55	B2
D409	RD33EB1	B2

AC-BC BOARD-1

CP401	PS2401-1	
D401	S1VB60	
D406	ERB12-02	

SCHEMATIC DIAGRAM OF PROCESS BOARD/POWER BOARD/AC-DC BOARDS



	WV-CD20	WV-CD24
F401	630mA250V	1.6A125V
R405	47K	22K
C403	10μF400V	470μF250V
C405	6800PF	0. 22μF
R401	390(1/2W)	5.6K
R402	220K(2W)	10K(1W)
R403	820	82

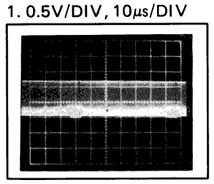
D2	Q208	2SC2404-CD	D3
C6	D201	MA151A	D6
C8	D202	0A91	C7
	D203	0A91	C7
	LED BOARD		
	D250	LN238RPH	C3

POWER BOARD		
IC301	YFSR8201	A5
IC302	NJM78L20A	A8,B8
IC303	NJM79L05A	A8
Q301	2SB819	A5,B5
Q302	2SB819	A5,B5
Q303	2SD601-Q	A6,A7
Q304	2SD1081 L-BC	A7
Q305	2SC2404-CD	A6
Q306	2SA1022-C	A6
D301	SS1.5J4	A5
D302	SS1.5J4	A5
D303	SS1.5J4	B7
D304	MA151WK	A7
D305	SS1.5J4	A7
D311	MA151K	B9
SUBPOWER BOARD		
IC311	MN4069BS	B8
IC312	MN4528BS	A8

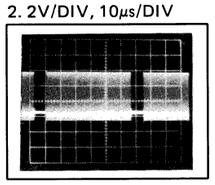
AC-CD BOARD-2		
IC401	M5237L	B3
Q401	2SC3549	A2
Q402	2SB744	B3
D402	RU1P	B2
D403	1SS55	A2
D404	RD6.2EB2	A2
D405	1SS55	A2
D407	ERA81-004	B3
D408	1SS55	B2
D409	RD33EB1	B2

AC-BC BOARD-1		
CP401	PS2401-1	A2
D401	S1VB60	B1
D406	ERB12-02	B1

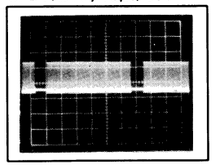
1. 0.5V/DIV, 10μs/DIV



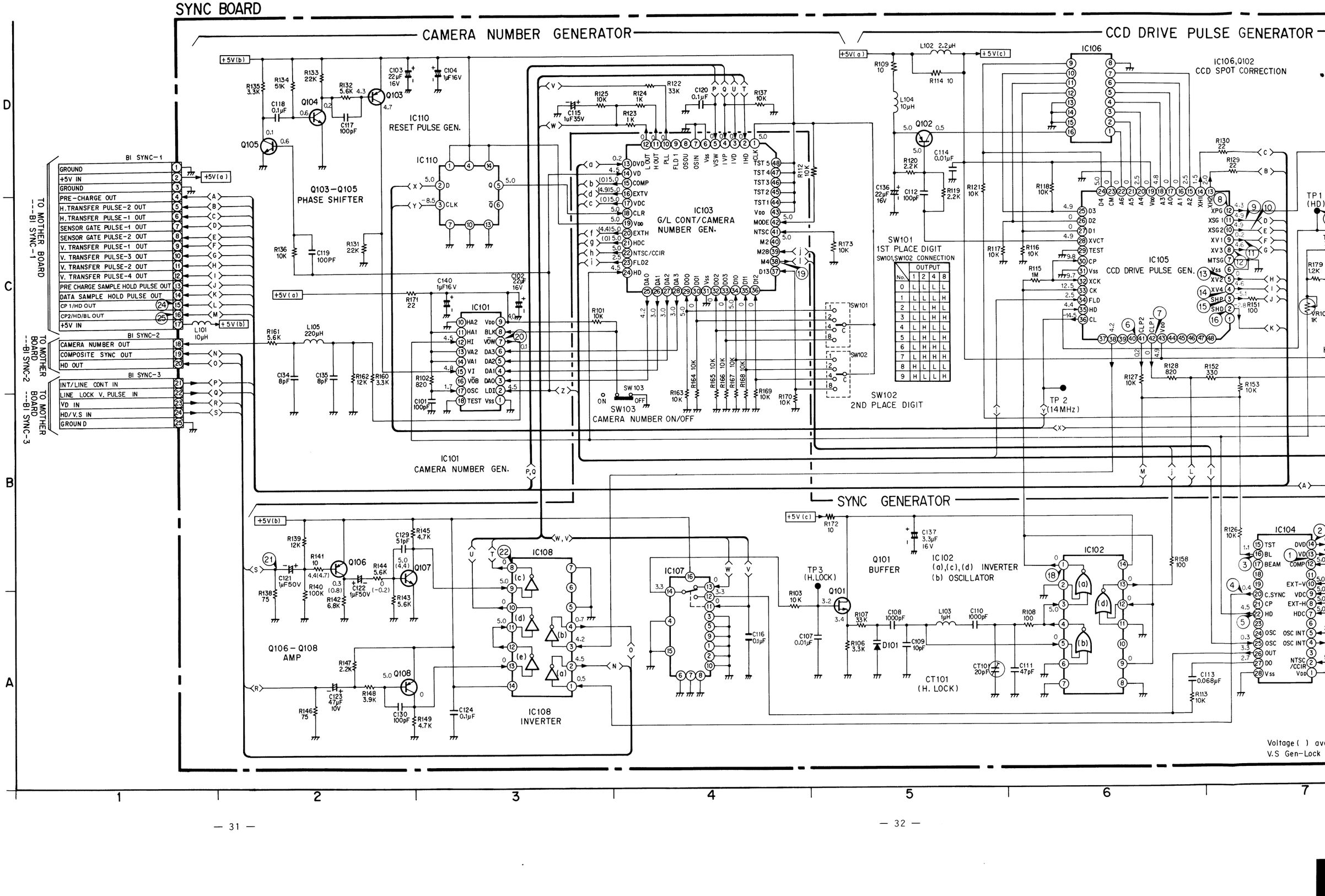
2. 2V/DIV, 10μs/DIV



3. 2V/DIV, 10μs/DIV



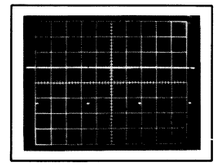
SCHEMATIC DIAGRAM OF SYNC BOARD



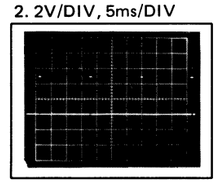
SCHEMATIC DIAGRAM OF SYNC BOARD

Note : IC106 does not come with the CCD image sensor which has no spots/blemishes.

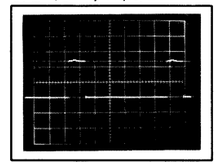
1. 2V/DIV, 5ms/DIV



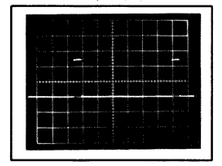
2. 2V/DIV, 5ms/DIV



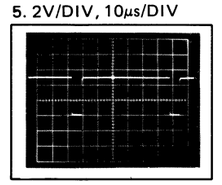
3. 2V/DIV, 10μs/DIV



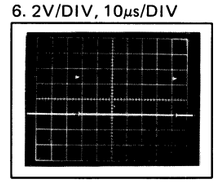
4. 2V/DIV, 10μs/DIV



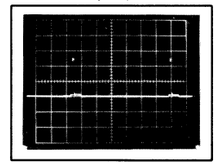
5. 2V/DIV, 10μs/DIV



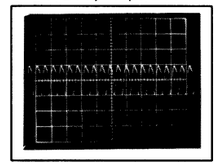
6. 2V/DIV, 10μs/DIV



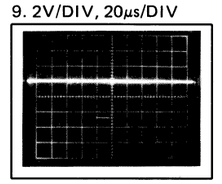
7. 2V/DIV, 10μs/DIV



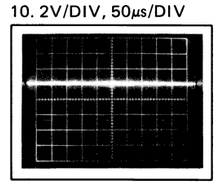
8. 2V/DIV, 0.2μs/DIV



9. 2V/DIV, 20μs/DIV



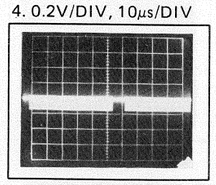
10. 2V/DIV, 50μs/DIV



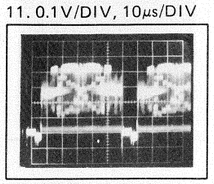
SYNC BOARD

IC101	MN1217A	B3,C3
IC102	MN74HC02S	A6
IC103	YFMB62H402	C4,D4
IC104	YFSC6433S	A7
IC105	YFCX23047B	C6
IC107	MN4053BS	A4
IC108	MN4069UBS	A3
IC109	MN74HC04S	C8
IC110	MN74HC74S	C3,D3
Q101	2SK198-Q	A5
Q102	2SB710-Q	D5
Q103	2SA1034-ST	D2
Q104	2SC2405STU	D2
Q105	2SC2405STU	D2
Q106	2SA1034-ST	B2
Q107	2SC2405STU	B2
Q108	2SA1034-ST	A2
D101	1SV73	A5

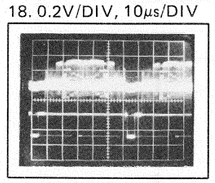
4. 0.2V/DIV, 10μs/DIV



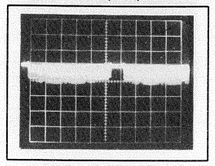
11. 0.1V/DIV, 10μs/DIV



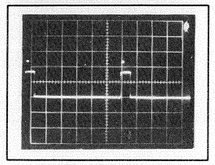
18. 0.2V/DIV, 10μs/DIV



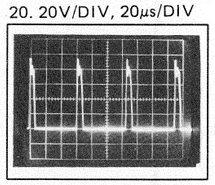
5. 0.2V/DIV, 10μs/DIV



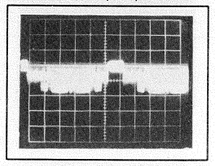
12. 2V/DIV, 10μs/DIV



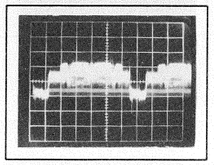
20. 20V/DIV, 20μs/DIV



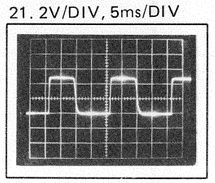
6. 0.1V/DIV, 10μs/DIV



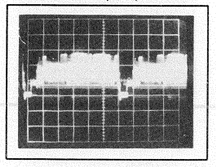
13. 50mV/DIV, 10μs/DIV



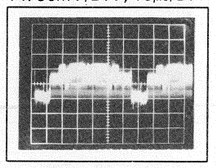
21. 2V/DIV, 5ms/DIV



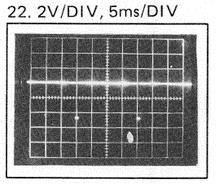
7. 0.2V/DIV, 10μs/DIV



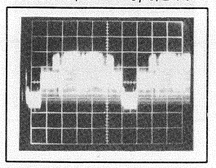
14. 50mV/DIV, 10μs/DIV



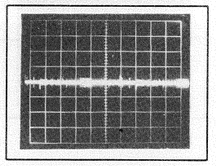
22. 2V/DIV, 5ms/DIV



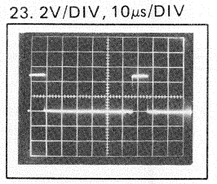
8. 50mV/DIV 10μs/DIV



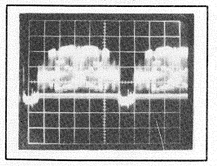
15. 0.1V/DIV, 10μs/DIV



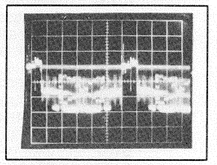
23. 2V/DIV, 10μs/DIV



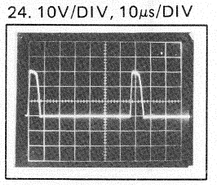
9. 0.1V/DIV, 10μs/DIV



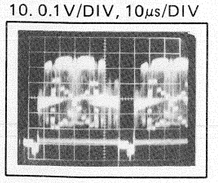
16. 0.2V/DIV, 10μs/DIV



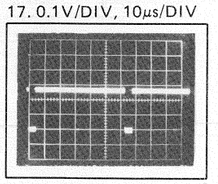
24. 10V/DIV, 10μs/DIV



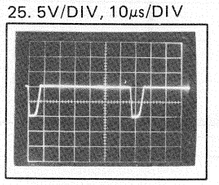
10. 0.1V/DIV, 10μs/DIV



17. 0.1V/DIV, 10μs/DIV



25. 5V/DIV, 10μs/DIV



PROCESS BOARD

IC201	YFCX10045	C5,D5
IC202	AN2110S	D5,D6
IC203	AN2210SA	C4,C5
IC204	NJM4556M	D5
Q201	2SK321-Q	C5
Q202	2SK321-Q	C5
Q203	2SK321-Q	C5
Q204	2SC2404-CD	C6
Q205	2SC2404-CD	C6
Q206	2SD601-Q	C5,D5
Q208	2SC2404-CD	C6
D201	MA151A	D6
D202	0A91	C4
D203	0A91	C4

LED BOARD

D250	LN238RPH	

POWER BOARD

IC301	YFSR8201	B4
IC302	NJM78L20A	B4
IC303	NJM79L05A	B4
Q301	2SB819	B4
Q302	2SB819	B4
Q303	2SD601-Q	B4
Q304	2SD1081L-BC	B3,B4
Q305	2SC2404-CD	B3
Q306	2SA1022-C	B3
D301	SS1.5J4	B4
D302	SS1.5J4	B4
D303	SS1.5J4	B4
D304	MA151WK	B4
D305	SS1.5J4	B4
D311	MA151K	B5

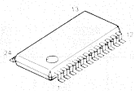
SUBPOWER BOARD

IC311	MN4069BS
IC312	MN4528BS

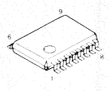
AC-CD BOARD-2		WV-CD20	WV-CD24
IC401	M5237L	B3	D3
Q401	2SC2549	A2	C2
Q402	2SB744	B3	D3
D402	RU1P	A2	C2,C3
D403	1SS55	A2	C2
D404	RD6.2EB2	A2	C2
D405	1SS55	A2	C2
D407	ERA81-004	A2	C2
D408	1SS55	NONE	C3
D409	RD33EB1	NONE	C3

AC-DC BOARD-1			
CP401	PS2401-1	A1,B1	D2
D401	S1VB60	A1	C1
D406	ERD12-02	A1	C1

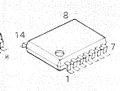
AN2110S
AN2210SA



YFCX10045
MN4528BS

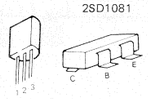


MN4069BS



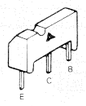
NJM4556M

78L05A
78L20A



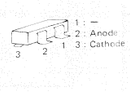
2SA1022
2SC2404
2SD601
2SD1081

2SB819

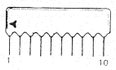


2SK198

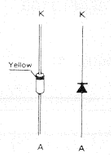
MA151K



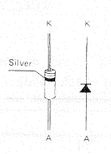
YFSR8201



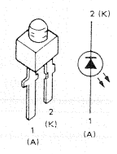
OA91



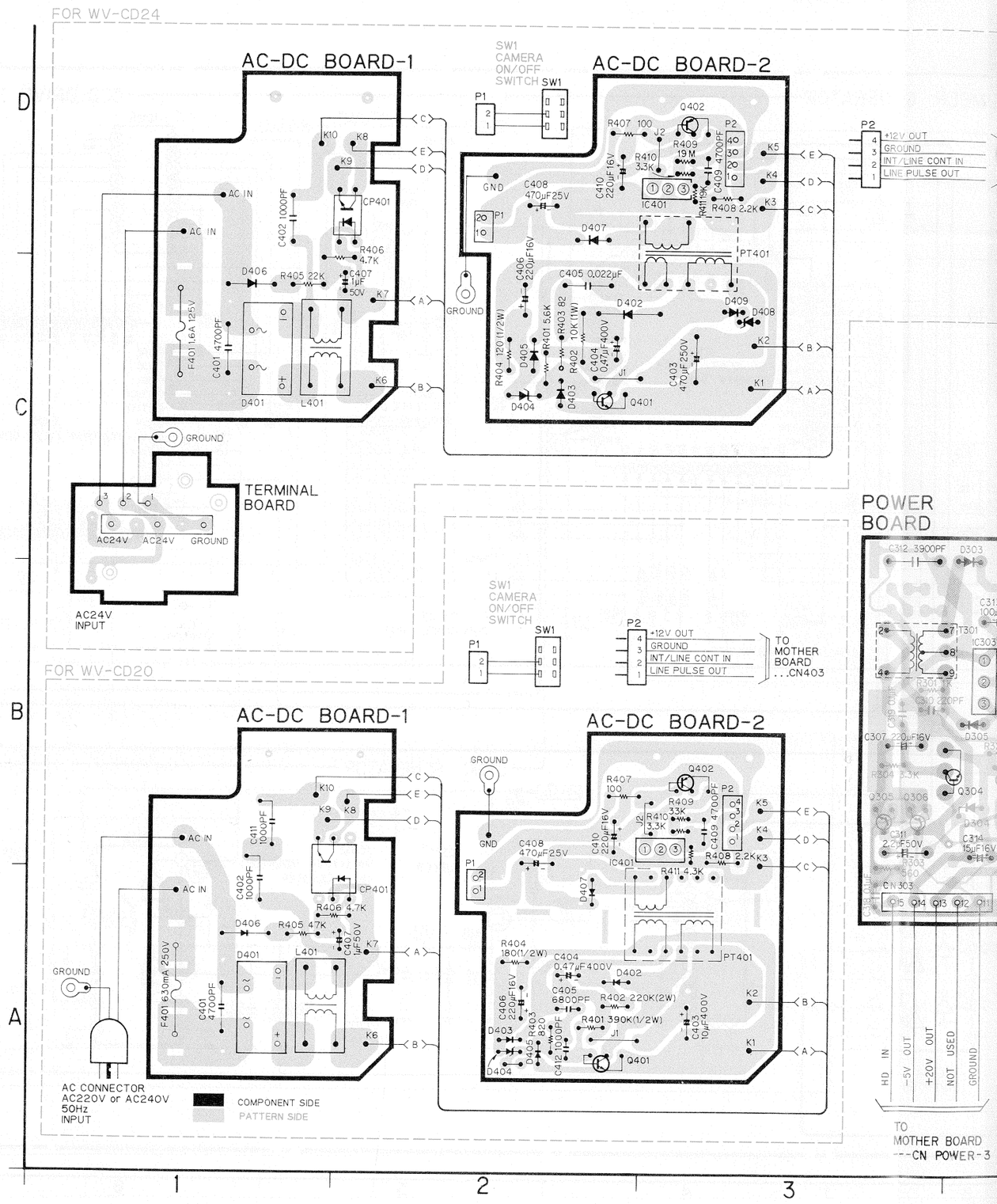
SS1.5J4



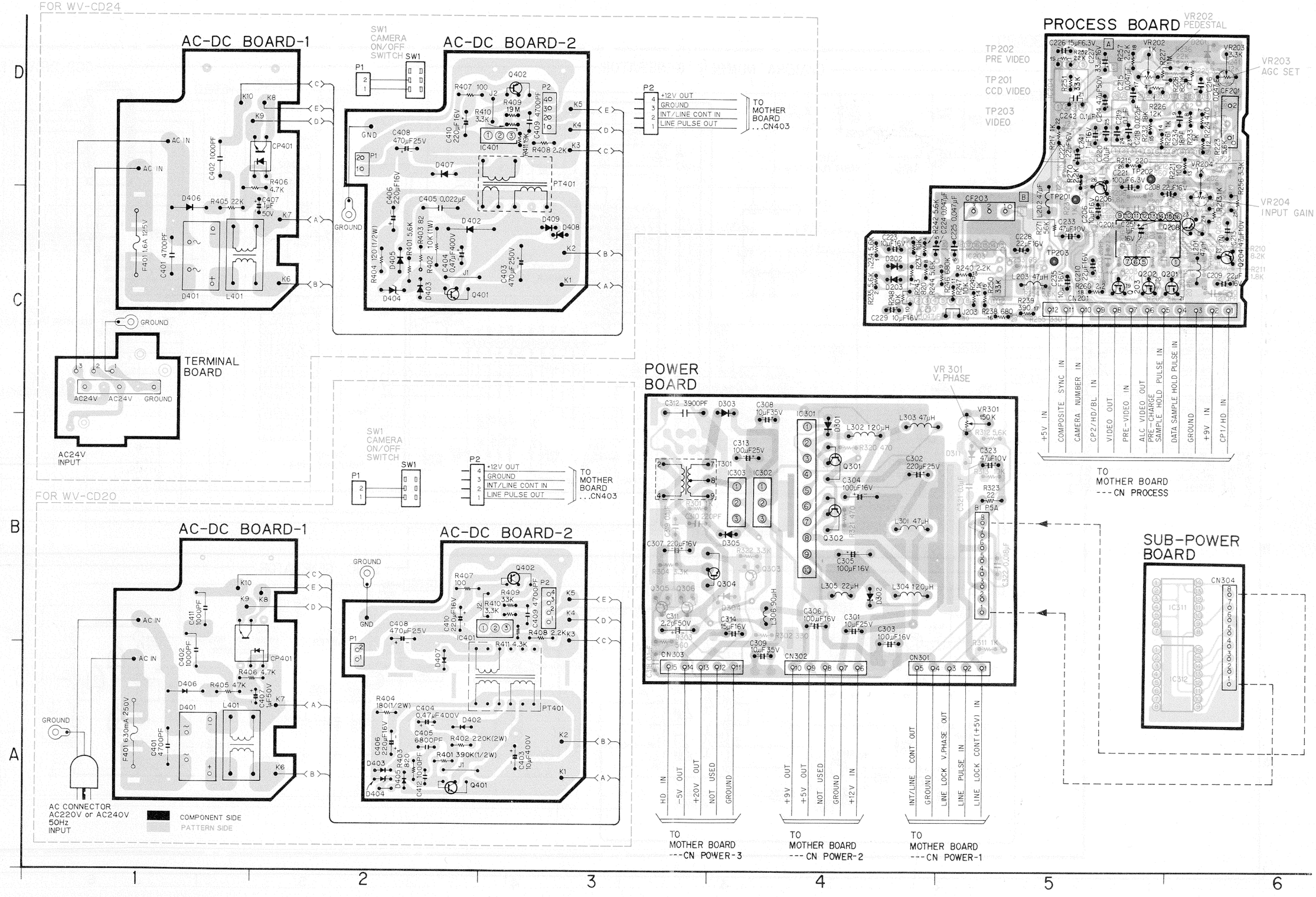
LN238RPH



CONDUCTOR VIEW OF PROCESS BOARD/POWER



CONDUCTOR VIEW OF PROCESS BOARD/POWER BOARD/AC-DC BOARDS



WV-CD24
D3
C2
D3
C2,C3
C2
C2
C2
C2
C3
C3

D2
C1
C1

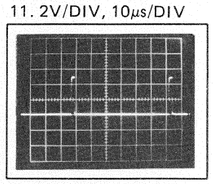
069BS NJM4556M

MA151K

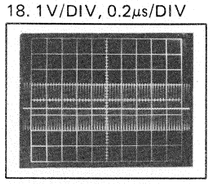
1 : —
2 : Anode
3 : Cathode

LN238RPH

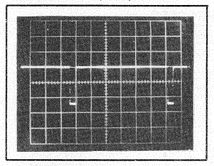
11. 2V/DIV, 10μs/DIV



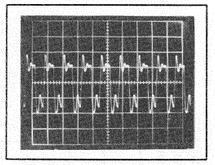
18. 1V/DIV, 0.2μs/DIV



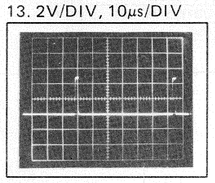
12. 2V/DIV, 10μs/DIV



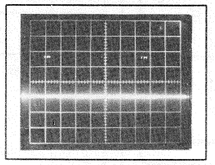
19. 2V/DIV, 0.2μs/DIV



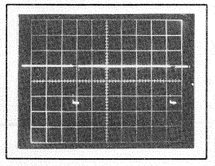
13. 2V/DIV, 10μs/DIV



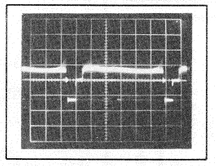
20. 1V/DIV, 10μs/DIV



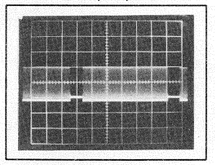
14. 2V/DIV, 10μs/DIV



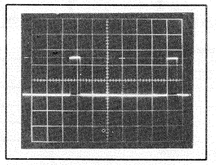
21. 0.2V/DIV, 10μs/DIV



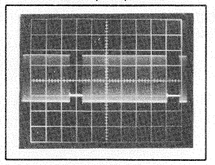
15. 2V/DIV, 10μs/DIV



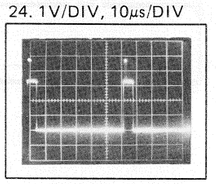
22. 2V/DIV, 10μs/DIV



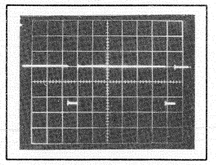
16. 2V/DIV, 10μs/DIV



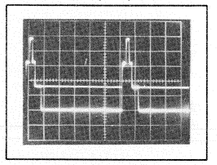
24. 1V/DIV, 10μs/DIV



17. 2V/DIV, 10μs/DIV



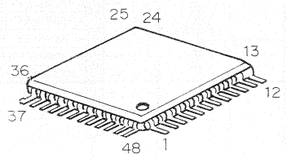
25. 1V/DIV, 10μs/DIV



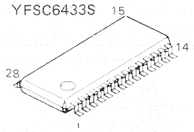
SYNC BOARD

IC101	MN1217A	D1,D2
IC102	MN74HC02S	C2,D2
IC103	YFMB62H402	C2
IC104	YFSC6433S	C2
IC105	YFCX23047B	C1
IC107	MN4053BS	C1
IC108	MN4069UBS	B2
IC109	MN74HC04S	B1
IC110	MN74HC74S	C1
Q101	2SK198-Q	C2
Q102	2SB710-Q	D1
Q103	2SA1034-ST	B2
Q104	2SC2405STU	B2
Q105	2SC2405STU	C2
Q106	2SA1034-ST	B3,C3
Q107	2SC2405STU	B2
Q108	2SA1034-ST	B2
D101	1SV73	D3

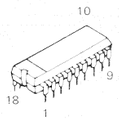
YFMB62H402
YFCX23047B



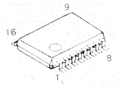
YFSC6433S



MN1217A

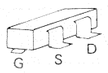


MN4053BS

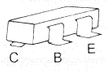


MN74HC02S
MN4069UBS
MN74HC04S
MN74HC74S

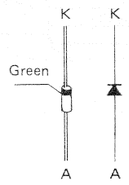
2SK198



2SA1034
2SB710
2SC2405

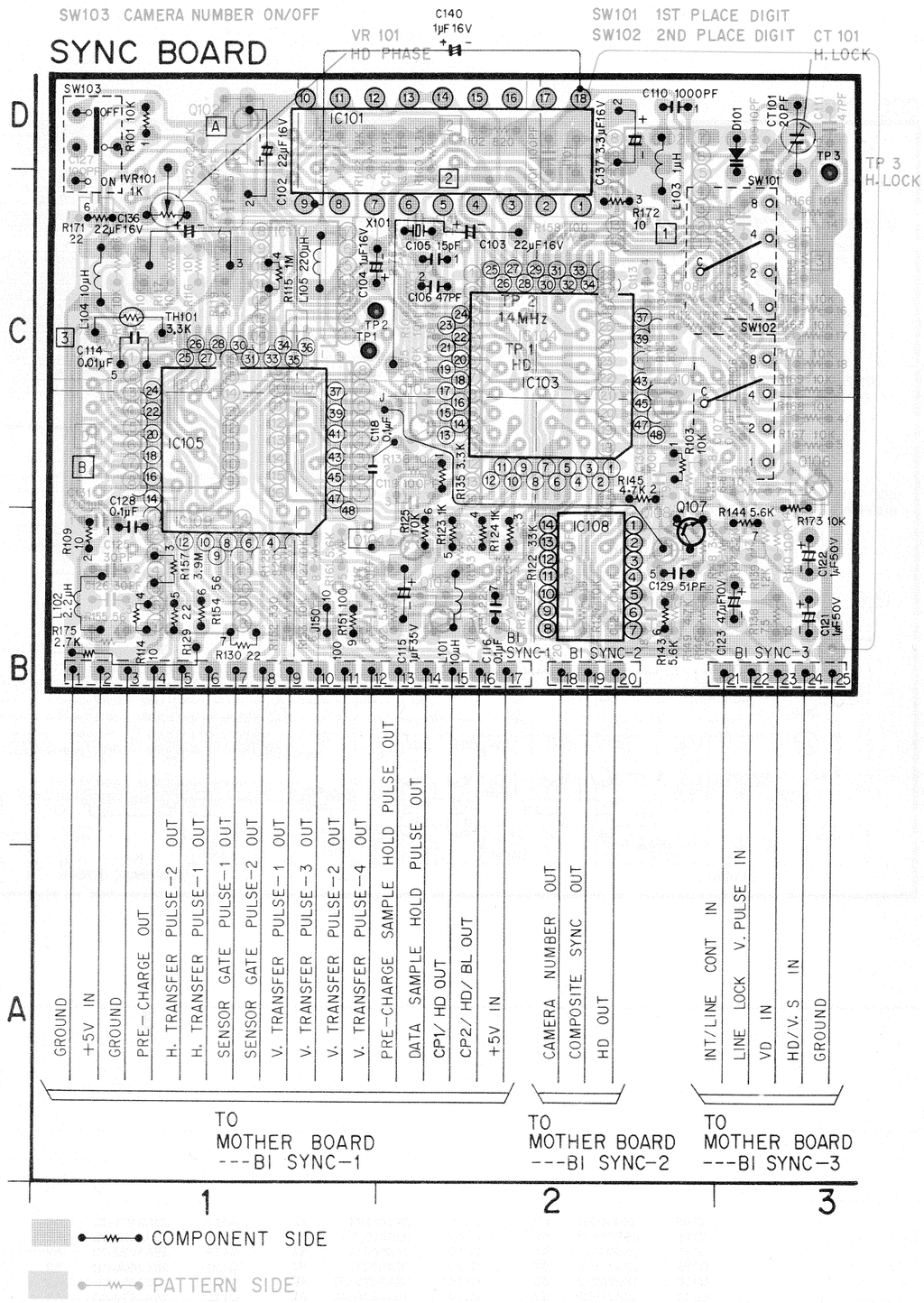


1SV73

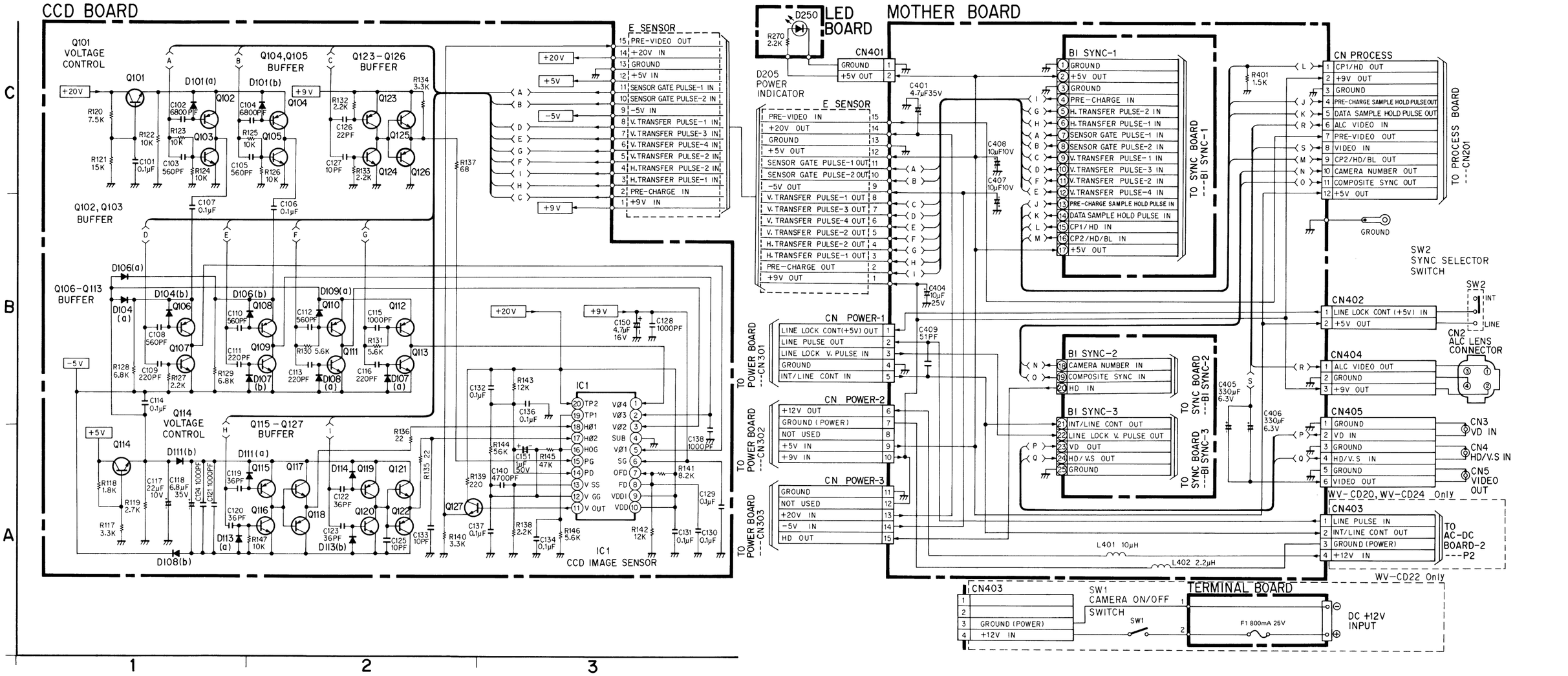


Note : IC106 does not come with the CCD image sensor which has no spots/blemishes.

CONDUCTOR VIEW OF SYNC BOARD

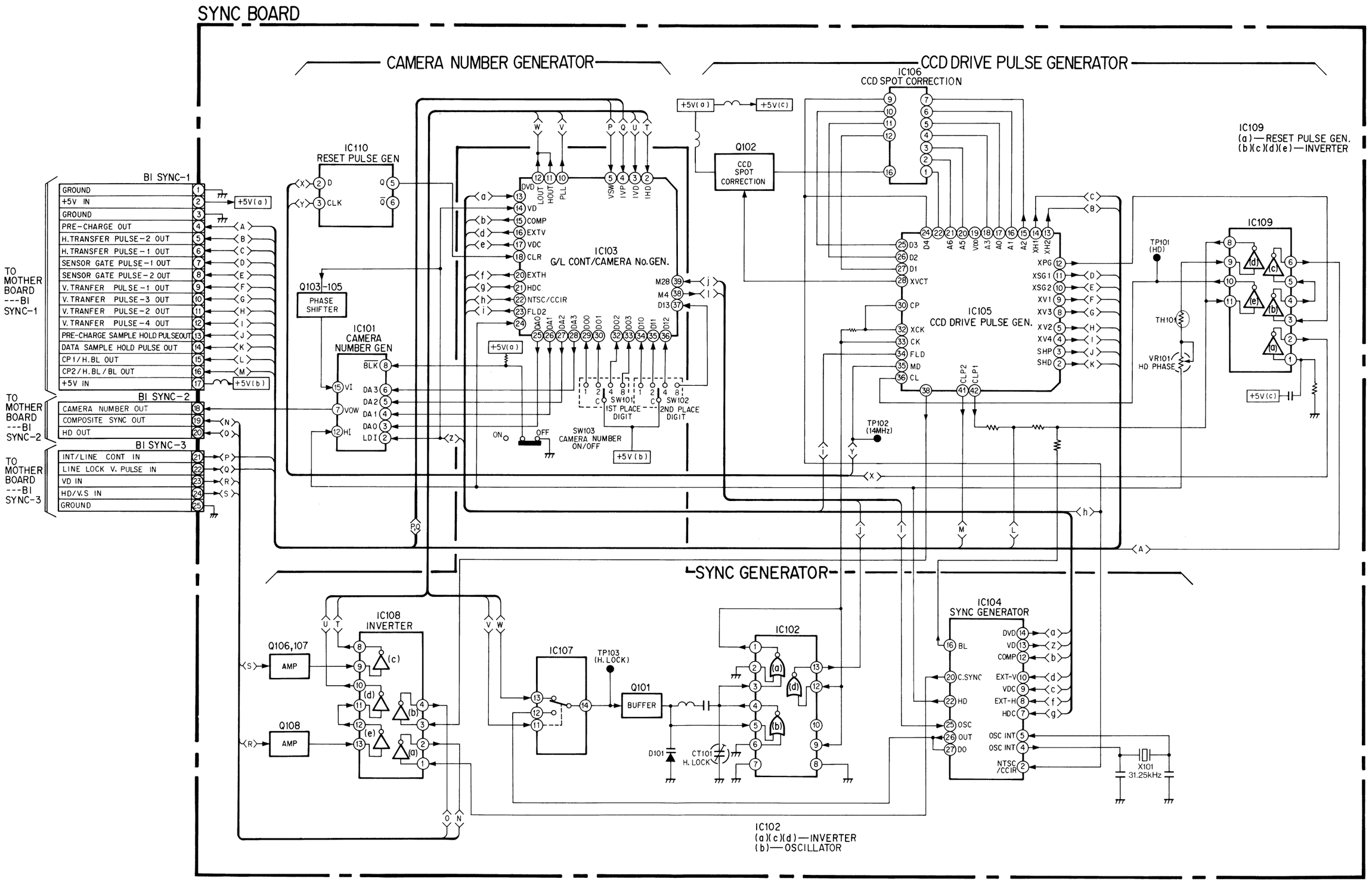


SCHEMATIC DIAGRAM OF CCD BOARD/MOTHER BOARD

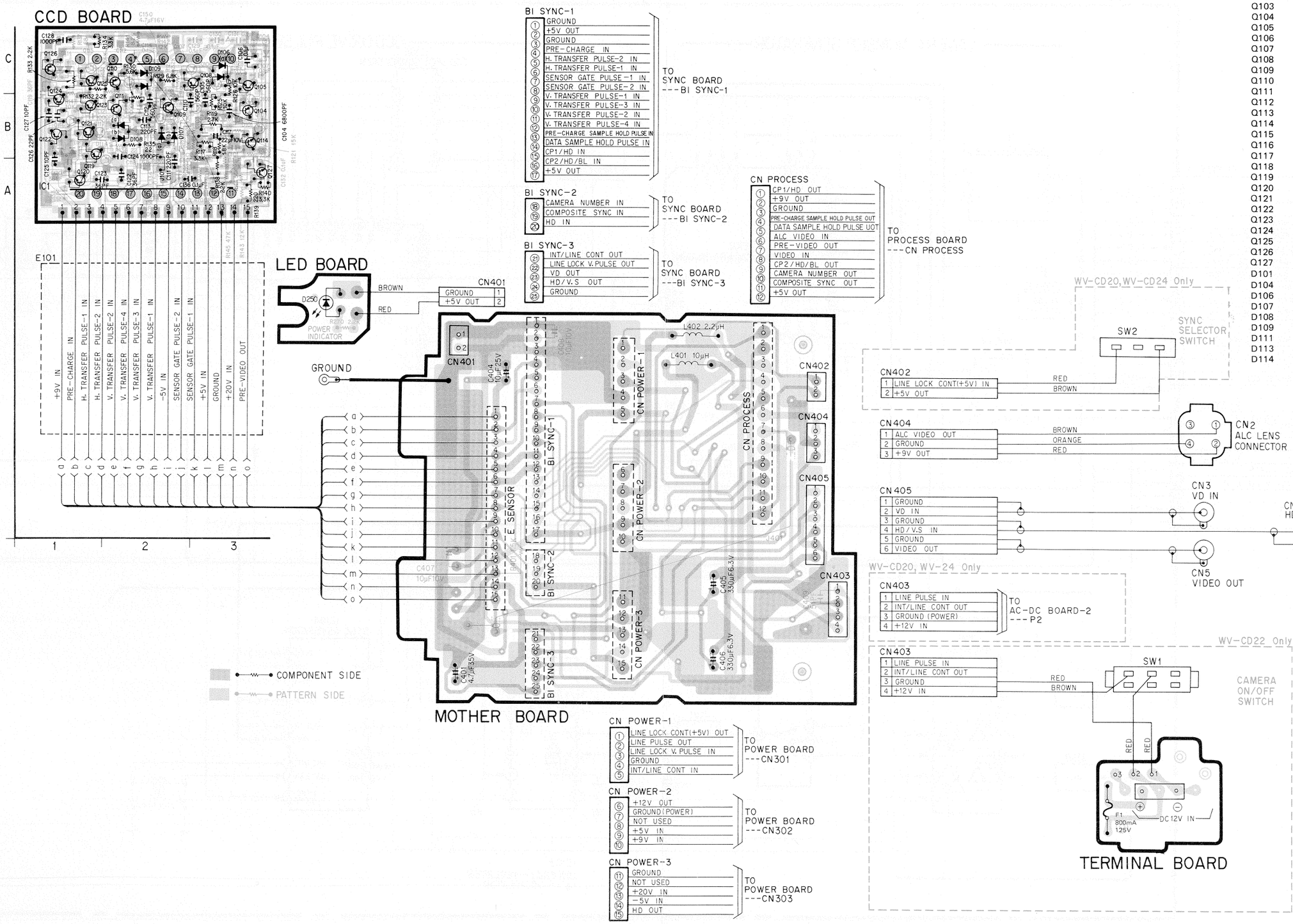


Q105	2SD602-Q	C2	Q111	2SD602-Q	B2	Q117	2SC2404-CD	A2	Q123	2SA1022-CD	D104	MA151WK	B1	D113	MA151WA	A2
Q106	2SB710-Q	B1	Q112	2SB710-Q	B2	Q118	2SA1022-CD	A2	Q124	2SC2404-CD	D106	MA151WK	B1,B2	D114	MA151WK	A2
Q107	2SD602-Q	B1	Q113	2SD602-Q	B2	Q119	2SA1022-CD	A2	Q125	2SC2404-CD	D107	MA151WA	B2			
Q108	2SB710-Q	B2	Q114	2SD602-Q	A1	Q120	2SC2404-CD	A2	Q126	2SA1022-CD	D108	MA153	A1,B2			
Q109	2SD602-Q	B2	Q115	2SA1022-CD	A2	Q121	2SC2404-CD	A2	Q127	2SC2778-BCTW	D109	MA151WK	B2			
Q110	2SB710-Q	B2	Q116	2SC2404-CD	A2	Q122	2SA1022-CD	A2	D101	MA151WK	D111	MA151WK	A1,A2			

BLOCK DIAGRAM OF SYNC BOARD



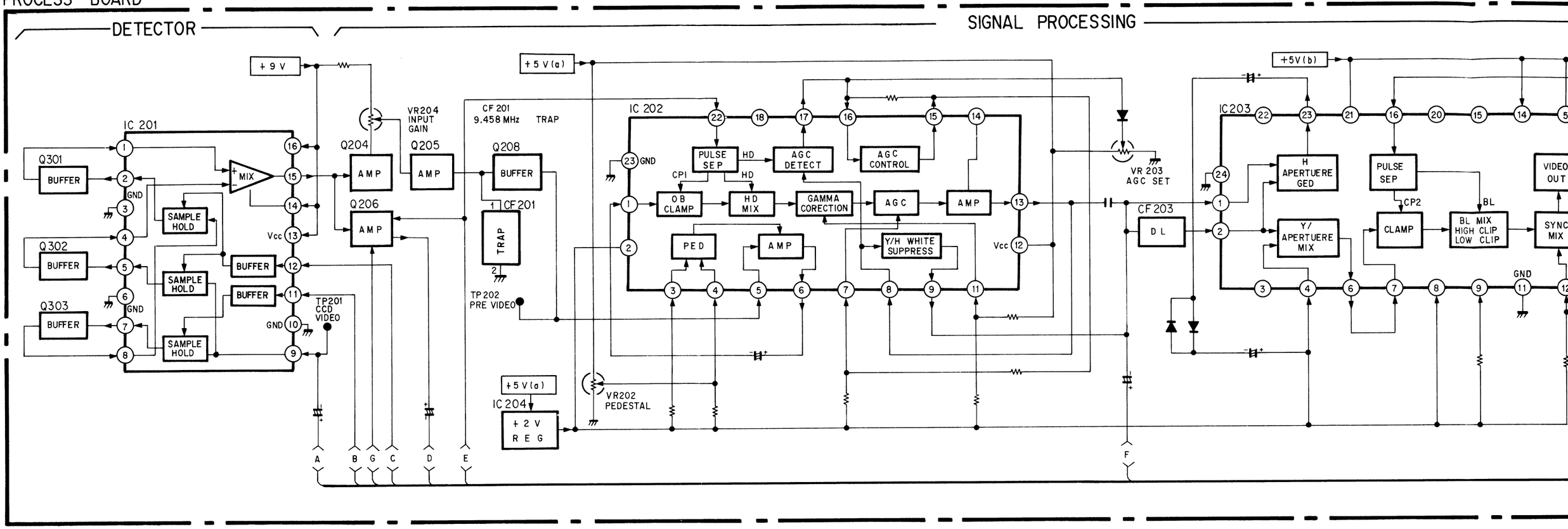
CONDUCTOR VIEW OF CCD BOARD/MOTHER BOARD

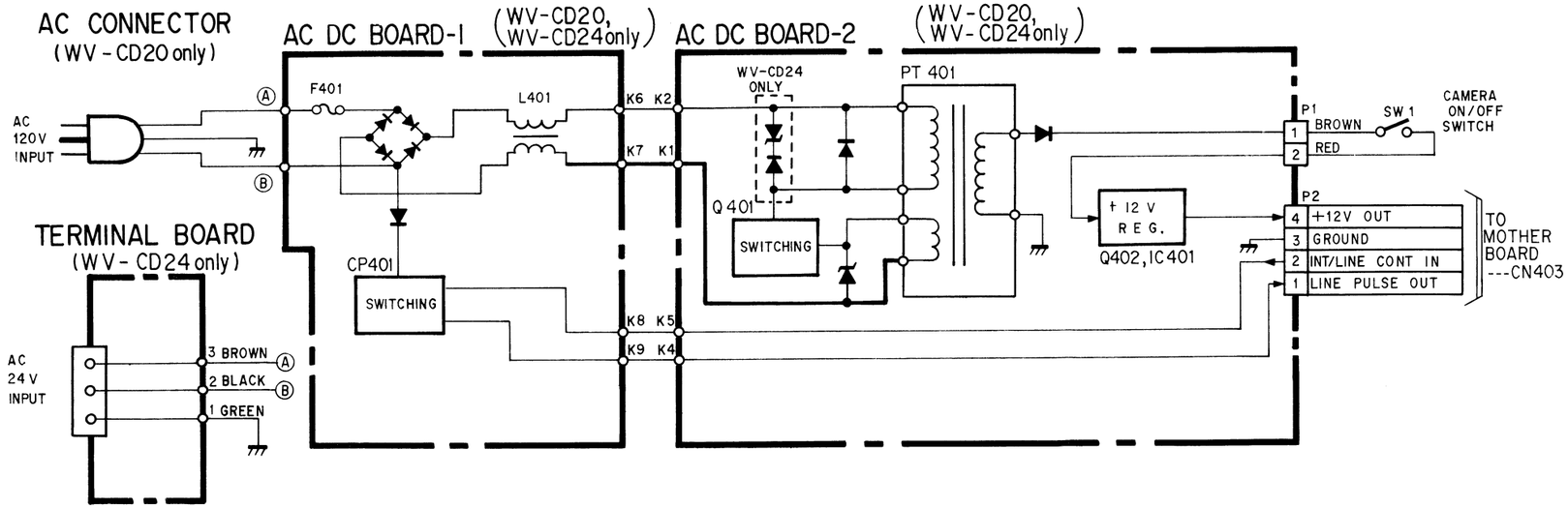


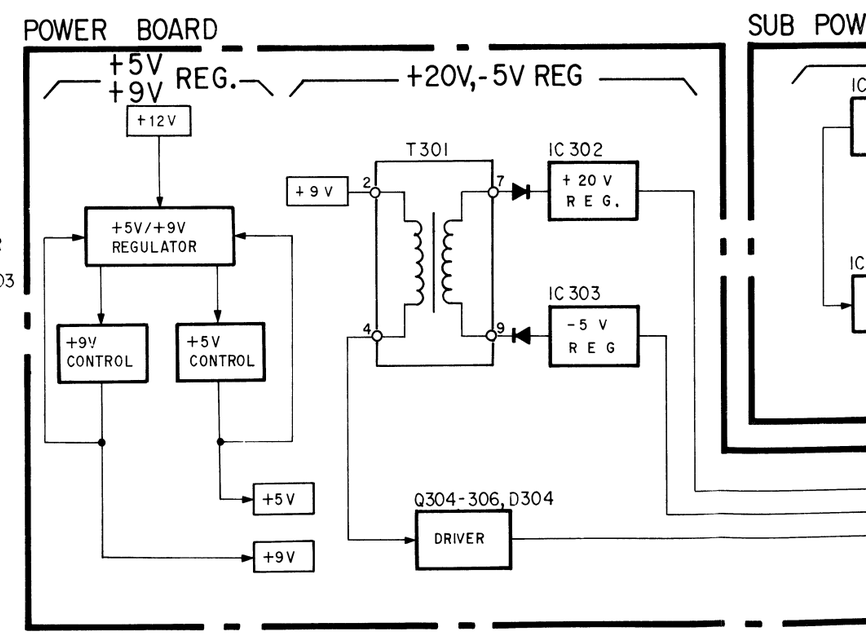
CCD BOARD

IC1	CX018L	A1-C3
Q101	2SD602-Q	B3
Q102	2SB710-Q	B3
Q103	2SD602-Q	B3
Q104	2SB710-Q	B3
Q105	2SD602-Q	C3
Q106	2SB710-Q	C3
Q107	2SD602-Q	C2,C3
Q108	2SB710-Q	C2,C3
Q109	2SD602-Q	B2
Q110	2SB710-Q	C2
Q111	2SD602-Q	B2
Q112	2SB710-Q	C2
Q113	2SD602-Q	B2
Q114	2SD602-Q	B3
Q115	2SA1022-CD	C1
Q116	2SC2404-CD	B1
Q117	2SC2404-CD	B1,B2
Q118	2SA1022-CD	A1,B1
Q119	2SA1022-CD	A1,B1
Q120	2SC2404-CD	A1
Q121	2SC2404-CD	B1
Q122	2SA1022-CD	B1
Q123	2SA1022-CD	B1
Q124	2SC2404-CD	B1,C1
Q125	2SC2404-CD	C1
Q126	2SA1022-CD	C1
Q127	2SC2778-BCTW	A3
D101	MA151WK	B3
D104	MA151WK	C3
D106	MA151WK	C3
D107	MA151WA	B2
D108	MA153	B2
D109	MA151WK	C2
D111	MA151WK	C1
D113	MA151WA	B1
D114	MA151WK	B2

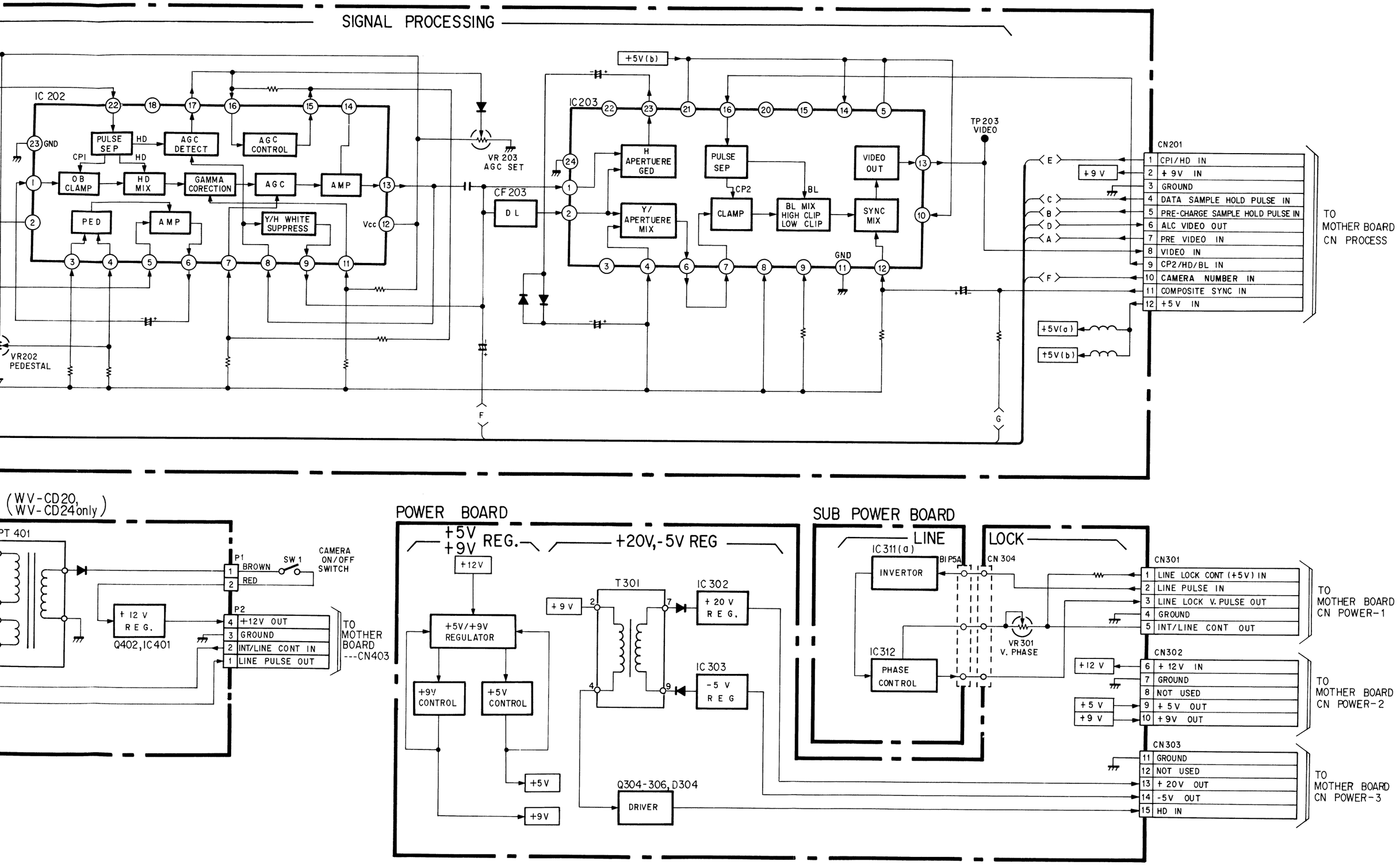
BLOCK DIAGRAM OF PROCESS BOARD/POWER BOARD/AC-DC BOARD



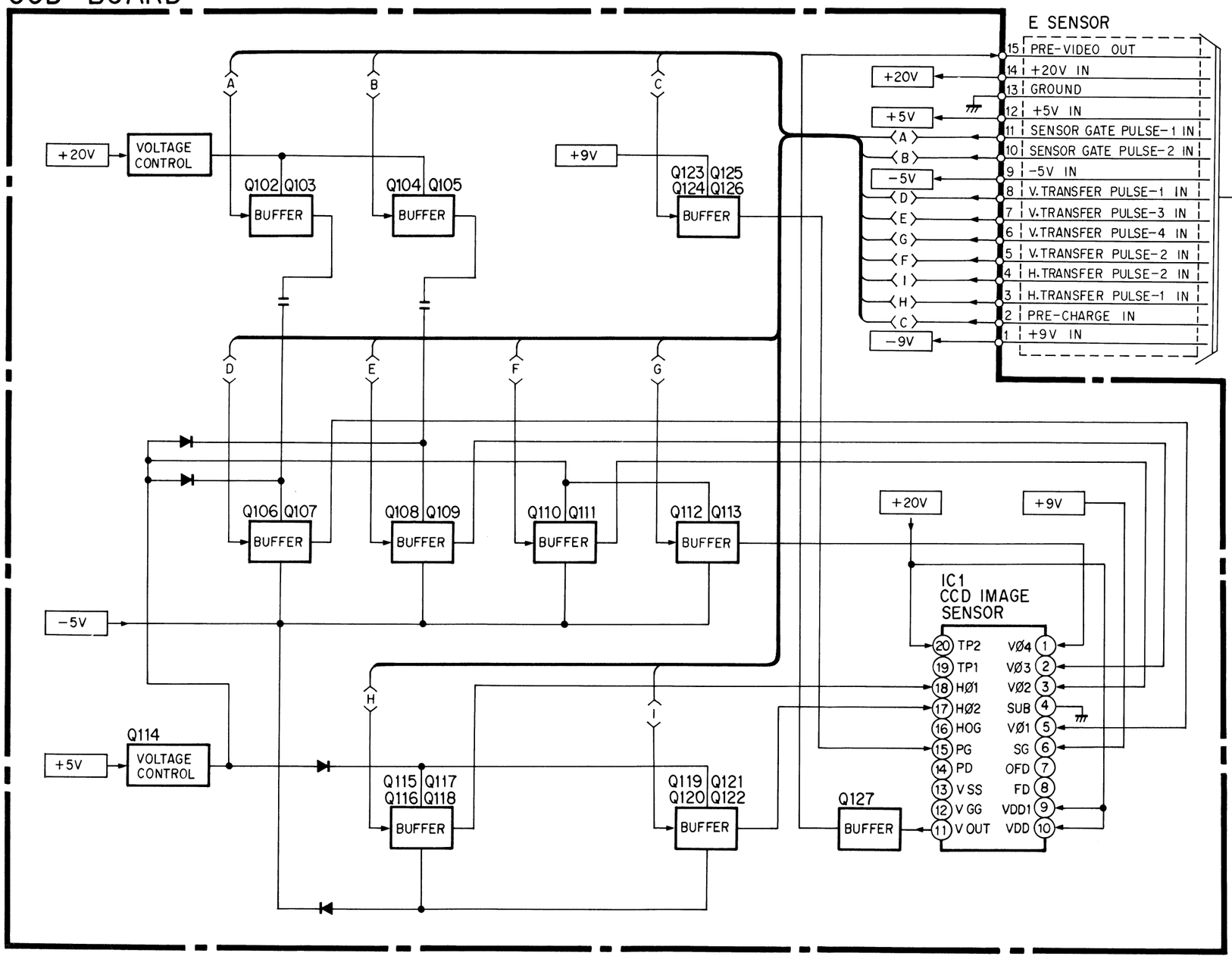


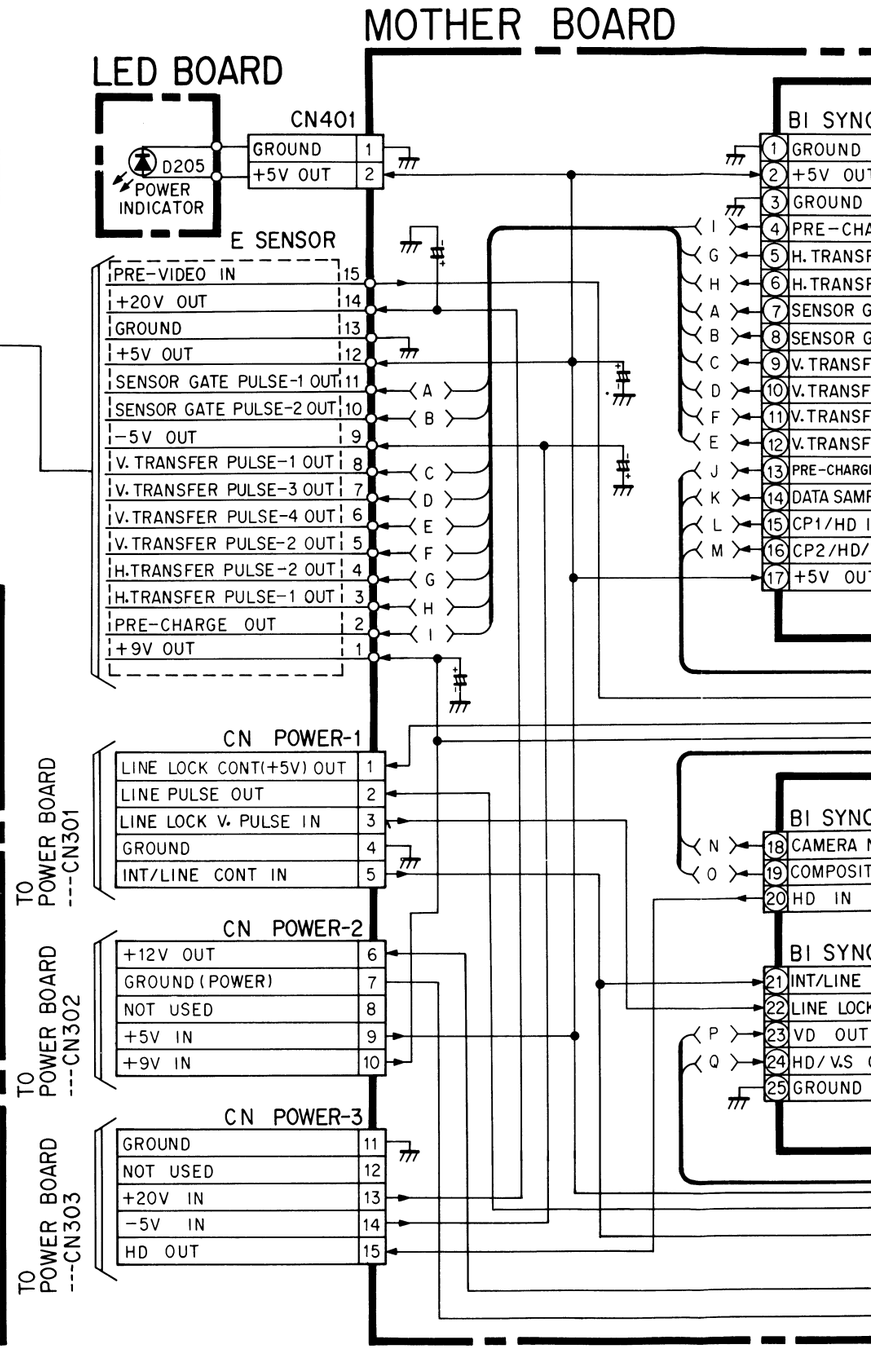


BLOCK DIAGRAM OF PROCESS BOARD/POWER BOARD/AC-DC BOARD

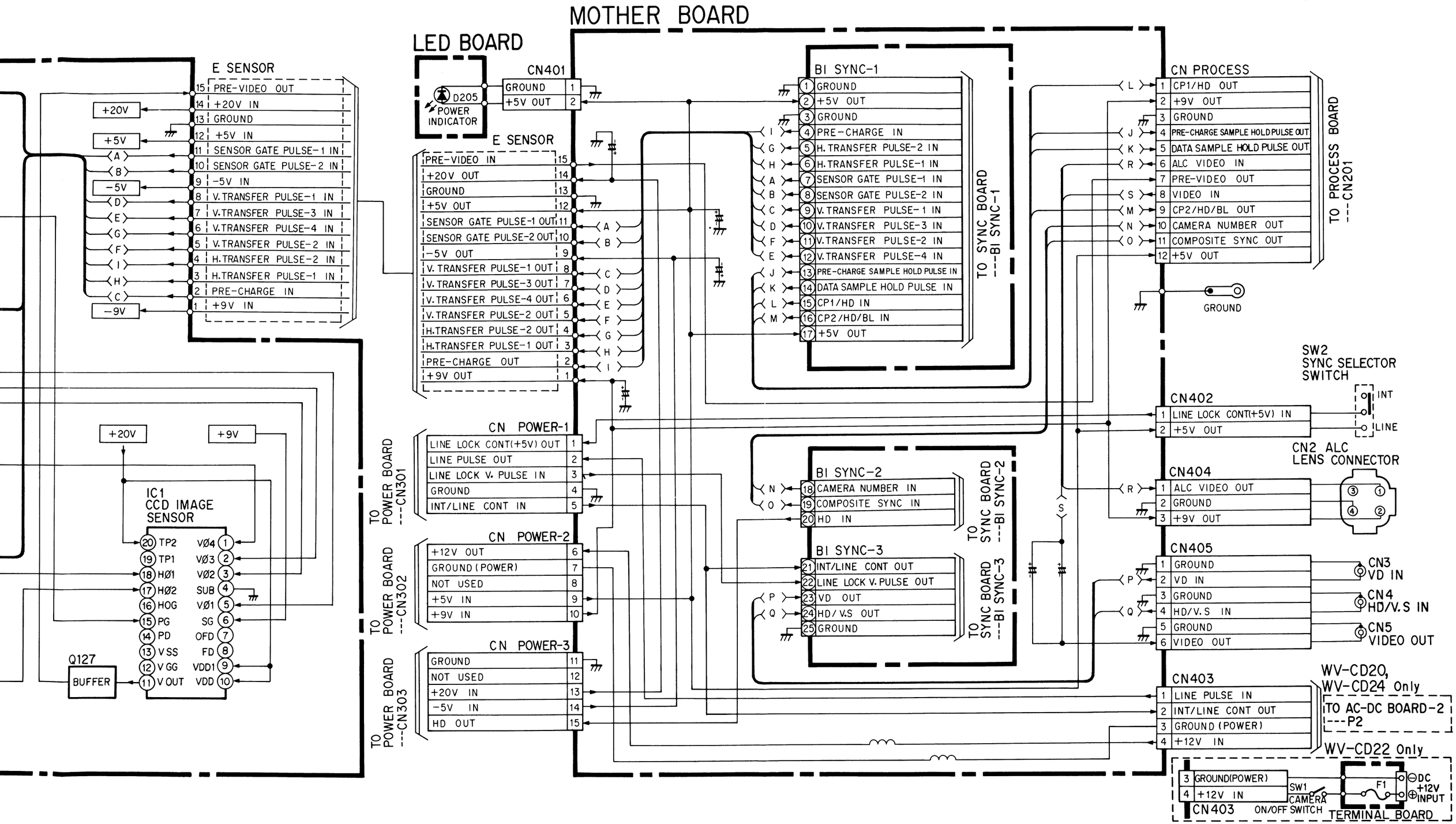


BLOCK DIAGRAM OF CCD BOARD/MOTHER BOARD





BLOCK DIAGRAM OF CCD BOARD/MOTHER BOARD



EXPLODED VIEW OF CCTV CAMERA(WV-CD20 / WV-CD24)

○ Numbers Show Screws

No.	Screws	Description
①	XSB2 + 4FX	Binding Head Screws
②	XSB26+4FX	Binding Head Screws
③	XSB26+5FX	Binding Head Screws
④	XSB26+6FX	Binding Head Screws
⑤	XSB4 + 6FX	Binding Head Screws
⑥	XSB26+6FXK	Binding Head Black Screws
⑦	YXM2+F8FX	Machine Screw and Washer Assembly
⑧	XXE2D6FXK	Soltted Screws
⑨	XSB3+6FX	Binding Head Screws

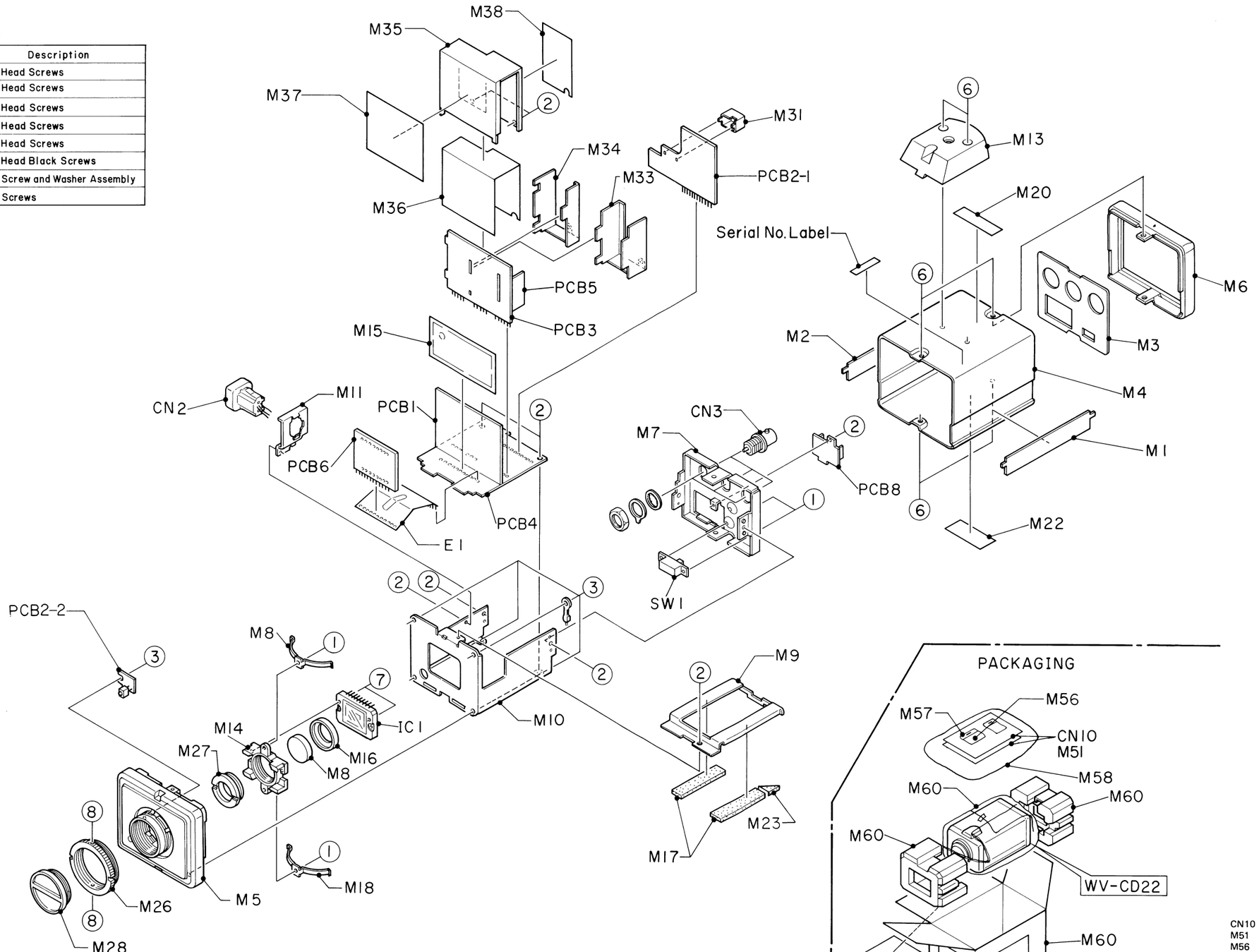
PCB1	YFVKYCD20E1A
PCB2-1	YFVKYCD20E2A
PCB2-2	YFVKYCD20P2A
PCB3	YFVKYCD20P3A
PCB4	YFVKYCD20P4A
PCB5	YFVKYCD20P5A
PCB6	YFVKYCD20P6A
PCB7	YFVKZCD24P1A
PCB8	P29013401ASY
PCB9	P29013402ASY
IC1	CX021L
SW1	YFMFS201N
SW2	YFSW6780102
E1	YFVRZCD50P7A
CN1	YFVKPCTSA25
	YFCE009908FA
	YFHBS308A
	YFVM009908A
CN2	YWRP97R4S
CN3-5	YWBNC-R
M1	YFV5WA0253A4
	YFV5WB0253A4
	YFV5WD0253A4
M2	YFV5WA0254A4
	YFV5WB0254A4
M3	YFV5WA0255A4
	YFV5WA0256A4
M4	YFV5EA0350A2
M5	YFV5BA0025A2
M6	YFV5BA0026A3
M7	YFV2KA0133A3
	YFV2KA0131A3
M8	YFIR2R5X16R5
M9	YFV2CA0103A4
M10	YFV2SA0219C3
M11	YFV2SA0220A4
M12	YFV2SA0223A3
M13	YFV2TA0020A3
M14	YFV6FA0047A4
M15	YFV2HA0316B4
M16	YFV2FA0101A4
M17	YFV2FA0113B4
M18	YFV4JA0115A4
M20	YFV7MA0099A4
M21	YFV7MA0120A4
M22	YFV7QA1017A4
	YFV7QA1018A4
	YFV7QA1015A4
	YFV7QA1016A4
M23	YW-BCG-EM01
M24	YFV2FA0125A4
M25	YWSR6W-1
M26	YFV3FA0024A4
M27	YFV3FA0028A4
M28	YWBC-2B
M33	YFV2HA0321A4
M34	YFV2HA0322A4
M35	YFV2HA0323A4
M36	YFV2PA0139A4
M37	YFV2PA0140A4
M38	YFV2PA0141A4
M41	P2091-3301A
M42	P2901-3302A
M43	P2901-3303A
M44	P2901-3101A
M45	YF840620

CN10	YWRP97P4P
M51	YFV8QA973AN
	YFV8QA974AN
M53	19998700331
M56	YFV8PA0007A4
M57	YWT050803
M58	YWT20X35C03
M60	YFV9CA0776AN
	YFV9CA0768AN
M61	YFV8FA0070A4

EXPLODED VIEW OF CCTV CAMERA(WV-CD22)

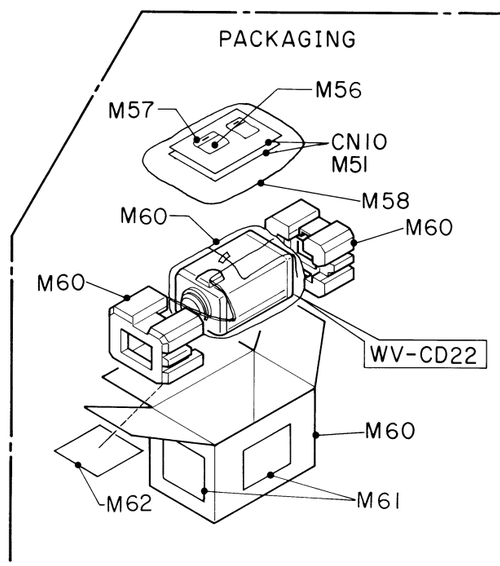
◯ Numbers Show Screws

No.	Screws	Description
①	XSB2 + 4FX	Binding Head Screws
②	XSB26+4FX	Binding Head Screws
③	XSB26+5FX	Binding Head Screws
④	XSB26+6FX	Binding Head Screws
⑤	XSB4 + 6FX	Binding Head Screws
⑥	XSB26+6FXK	Binding Head Black Screws
⑦	YXM2 +F8FX	Machine Screw and Washer Assembly
⑧	XXE2D6FXK	Soltted Screws



PCB1	YFVKYCD20E1A
PCB2-1	YFVKYCD20E2A
PCB2-2	YFVKYCD20P2A
PCB3	YFVKYCD20P3A
PCB4	YFVKYCD20P4A
PCB5	YFVKYCD20P5A
PCB6	YFVKYCD6A
PCB8	YFVKZCD20P1A
IC1	OX021L
SW1	YFMFS201N
E1	YFVRZCD50P7A
CN2	YWRP97R4S
CN3-5	YWBNC-R
M1	YFV5WA0250A4
M2	YFV5WA0252A4
M3	YFV5WB0251A4
M4	YFV5EA0342A2
M5	YFV5BA0025A2
M6	YFV5BA0026A3
M7	YFV2KA0131A3
M8	YFIR2R5X16R5
M9	YFV2CA0103A4
M10	YFV2SA0129C3
M11	YFV2SA0220A4
M13	YFV2TA0020A3
M14	YFV6FA0047A4
M15	YFV2HA0136B4
M16	YFV2FA0101A4
M17	YFV2FA0113B4
M18	YFV4JA0115A4
M19	YFV7MA0061A4
M20	YFV7MA0099A4
M22	YFV7QA1014A4
M23	YFV2FA0125A4
M24	YFV3FA0024A4
M25	YFV3FA0028A4
M28	YWBC-2B
M31	YFV2HA0331A4
M33	YFV2HA0321A4
M34	YFV2HA0322A4
M35	YFV2HA0323A4
M36	YFV2PA0139A4
M37	YFV2PA0140A4
M38	YFV2PA0141A4

PACKAGING



CN10	YWRP97P4P
M51	YFV8QA0972AN
M56	YFV8PA0007A4
M57	YWT050803
M58	YWT20X35C03
M59	YWT20X25C03
M60	YFV9CA0758AN
M61	YFV8FA0070A4
M62	YFV8FA0002A4

Important Notice

REPLACEMENT PARTS LIST

1. Components identified by ⚠ mark have special characteritics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Components identified by o mark are new parts used from this model.
3. Complete printed circuit board assembly is not available as replacement part.

SYM-BOL NO.	PART NO.	DESCRIPTION
	CCTV CAMERA WV-CD20	
	MISCELLANEOUS	
IC1	CX021L	LSI B/W CCD ASS'Y
SW1	YFMFS201N	Camera ON/OFF Switch
SW2	YFSW6780102	Sync Selector Switch
E1	YFVRZCD50P7A	Flexible Wire Assy
CN1 ⚠	YFKPGTSA25	AC Power Cord for WV-CD20N/A
⚠	YFCE009908FA	AC Power Cord WV-CD20 N/C
⚠	YFHBS308A	AC Power Cord for WV-CD20/B
⚠	YFVM009908A	AC Power Cord for WV-CD20/G
CN2	YWRP97R4S	4 pin Lens Connector
CN3 ~5	YWBNC-R	BNC Connector
M1	o YFV5WA0253A4	Right Side Panel
M2	o YFV5WA0254A4	Left Side Panel
M3	o YFV5WA0255A4	Rear Panel
M4	o YFV5EA0350A2	Cover
M5	o YFV5BA0025A2	Front Escutcheon
M6	o YFV5BA0026A3	Rear Escutcheon
M7	o YFV2KA0133A3	Rear Chassis
M8	YFIR2R5X16R5	Optical Filter
M9	o YFV2CA0103A4	Hold Plate
M10	o YFV2SA0219C3	Mounting Angle for Optical
M11	o YFV2SA0220A4	Mounting Angle for ALC Connector
M12	o YFV2SA0223A3	Mounting Angle for Power
M13	YFV2TA0020A3	Mounting Bracket
M14	o YFV6FA0047A4	Bracket
M15	o YFV2HA0316B4	Shield Parts
M16 ⚠	YFV2FA0101A4	Cushion for IR
M17 ⚠	oYFV2FA0113B4	Cushion A for Fix
M18	o YFV4JA0115A4	Spring
M20 ⚠	YFV7MA0099A4	Caution Label
M21 ⚠	YFV7MA0120A4	Fuse Extension Label
M22 ⚠	oYFV7QA1017A4	Main Label for WV-CD20/BCG
	oYFV7QA1018A4	Main Label for WV-CD20N/AC
M23	YW-BCD-EM01	Earth Lag
M24	oYFV2FA0125A4	Cushion B for Fix
M25	YWSR6W-1	Cord Clamp
M26	YFV3FA0024A4	FB Control Ring
M27	o YFV3FA0028A4	IR Cover Ring
M28	YWBC-2B	Body Cap
	SYNC BOARD	
PCB1	o YFVKYCD20E1A	Printed Circuit Board Assy
IC101	MN1217A	LSI
IC102	MN74HC02S	IC
IC103	YFMB62H402	IC
IC104	YFSC6433S	IC
IC105	YFCX23047B	LSI
IC107	MN4053BS	IC
IC108	MN4069UBS	IC
IC109	MN74HC04S	IC

SYM-BOL NO.	PART NO.	DESCRIPTION	
IC110	MN74HC74S	IC	
Q101	2SK198-Q	Transistor	
Q102	2SB710-Q	Transistor	
Q103	2SA1034-ST	Transistor	
Q104,105	2SC2405STU	Transistor	
Q106	2SA1034-ST	Transistor	
Q107	2SC2405STU	Transistor	
Q108	2SA1034-ST	Transistor	
D101	1SV53B	Diode	
TH101	ERTD2FHK332S	Thermistor	3.3K ohms
R101	YF2116103JT	Carbon	10K ohms 1/16W
R102	YF2116821GT	Carbon	820 ohms 1/16W
R103	YF2116103JT	Carbon	10K ohms 1/16W
R104	YF2116106JT	Carbon	10M ohms 1/16W
R105	YF2116224JT	Carbon	220K ohms 1/16W
R106	YF2116332JT	Carbon	3.3K ohms 1/16W
R107	YF2116333GT	Carbon	33K ohms 1/16W
R108	YF2116101JT	Carbon	100 ohms 1/16W
R109	YF2116100JT	Carbon	10 ohms 1/16W
R112	YF2116103JT	Carbon	10K ohms 1/16W
R113	YF2116103GT	Carbon	10K ohms 1/16W
R114	YF2116100JT	Carbon	10 ohms 1/16W
R115	YF2116105GT	Carbon	1M ohms 1/16W
R116-118	YF2116103JT	Carbon	10K ohms 1/16W
R119,120	YF2116222GT	Carbon	2.2K ohms 1/16W
R121	YF2116103JT	Carbon	10K ohms 1/16W
R122	YF2116333GT	Carbon	33K ohms 1/16W
R123,124	YF2116102GT	Carbon	1K ohms 1/16W
R125-127	YF2116103JT	Carbon	10K ohms 1/16W
R128	YF2116821GT	Carbon	820 ohms 1/16W
R129,130	YF2116220JT	Carbon	22 ohms 1/16W
R131-133	YF2116562JT	Carbon	5.6K ohms 1/16W
R134	YFV2116513JT	Carbon	51K ohms 1/16W
R135	YF2116332JT	Carbon	3.3K ohms 1/16W
R136,137	YF2116103JT	Carbon	10K ohms 1/16W
R138	YF2116750JT	Carbon	75 ohms 1/16W
R139	YF2116123JT	Carbon	12K ohms 1/16W
R140	YF2116104JT	Carbon	100K ohms 1/16W
R141	YF2116100JT	Carbon	10 ohms 1/16W
R142	YF2116682JT	Carbon	6.8K ohms 1/16W
R143,144	YF2116562JT	Carbon	5.6K ohms 1/16W
R145	YF2116472JT	Carbon	4.7K ohms 1/16W
R146	YF2116750JT	Carbon	75 ohms 1/16W
R147	YF2116222GT	Carbon	2.2K ohms 1/16W
R148	YF2116392JT	Carbon	3.9K ohms 1/16W
R149	YF2116472JT	Carbon	4.7K ohms 1/16W
R151	YF2116101JT	Carbon	100 ohms 1/16W
R152	YF2116331JT	Carbon	330 ohms 1/16W
R153	YF2116103JT	Carbon	10K ohms 1/16W
R154,155	YF2116560JT	Carbon	56 ohms 1/16W
R156	YF2116272JT	Carbon	2.7K ohms 1/16W
R157	YF2116395JT	Carbon	3.9M ohms 1/16W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R158	YF2116101JT	Carbon	100 ohms 1/16W
R160	YF2116332JT	Carbon	3.3K ohms 1/16W
R161	YF2116562JT	Carbon	5.6K ohms 1/16W
R162	YF2116123JT	Carbon	12K ohms 1/16W
R163-170	YF2116103JT	Carbon	10K ohms 1/16W
R171	YF2116220JT	Carbon	22 ohms 1/16W
R172	YF2116100JT	Carbon	10 ohms 1/16W
R173	YF2116103JT	Carbon	10K ohms 1/16W
R175	ERD10TJ272	Carbon	2.7K ohms 1/8W
R176	YF2116224JT	Carbon	220K ohms 1/16W
R178	ERS-A39J102	Thermal	1K ohms
R179	ERD10TJ122	Carbon	1.2K ohms 1/8W
VR101	YFH0522A1K	Variable Resistor	1K ohms
C101	YF400101UJJT	Ceramic	100 pF
C102	ECSE1CT226R	Tantalum	22 μF 16V
C103	ECSF1CE226	Tantalum	22 μF 16V
C104	ECSF1CE105	Tantalum	1 μF 16V
C105	YF400150CHJT	Ceramic	15 pF
C106	YF400470CHJT	Ceramic	47 pF
C107	YF400103FZT	Ceramic	0.01 μF
C108	YF400102XKT	Ceramic	1000 pF
C109	YF400100UJDT	Ceramic	10 pF
C110	YF400102XKT	Ceramic	1000 pF
C111	YF400470UJJT	Ceramic	47 pF
C112	YF400101CHJT	Ceramic	100 pF
C113	YF400683FZT	Ceramic	0.068 uF
C114	YF400103FZT	Ceramic	0.01 μF
C115	ECSE1VT105R	Tantalum	1 μF 35V
C116	YF400104FZT	Ceramic	0.1 μF
C117	YF400101CHJT	Ceramic	100 pF
C118	ECQV1H104JZ	Metal	0.1 μF 50V
C119	YF400101CHJT	Ceramic	100 pF
C120	YF400104FZT	Ceramic	0.1 μF
C121,122	ECEA1HKS010	Electrolytic	1 μF 50V
C123	ECEA1AKS470	Electrolytic	47 μF 10V
C124	YF400104FZT	Ceramic	0.1 μF
C125,126	YF400300CHJT	Ceramic	30 pF
C127	YF400101CHJT	Ceramic	100 pF
C128	YF400104FZT	Ceramic	0.1 μF
C129	YF400510CHJT	Ceramic	51 pF
C130	YF400101CHJT	Ceramic	100 pF
C131	YF400103FZT	Ceramic	0.01 μF
C134,135	YF400080CHDT	Ceramic	8 pF
C136	ECSE1CT226R	Electrolytic	22 μF 16V
C137	ECSE1CT335SM	Electrolytic	3.3 μF 16V
C140	ECSF1CE105	Tantalum	1 μF 16V
C141	YF400030CHJT	Ceramic	3 pF
CT101	YFCTC6H20SC1	Trimmer Capacitor	20 pF
L101	NL4532T100K	Coil	10 μH
L102	NL32T2R2K	Coil	2.2 μH
L103	YFTKCD50	Coil	1 μH
L104	NL4532T100K	Coil	10 μH
L105	YFNL45T221K	Coil	220 μH
SW101,102	YFS-2011	Rotary Switch	
SW103	YWSSS21200	Slide Switch	

SYM-BOL NO.	PART NO.	DESCRIPTION	
X101	YWBWVHS3125K	Crystal Oscillator	31.25KHz
J101	YF21160R00T	Jumper Resistor	
J150	YF21160R00T	Jumper Resistor	
E101,102	o YW32BM7R5	Terminal	
E103	YW32BM4R5	Terminal	

PROCESS BOARD

PCB2-1	oYFVKYCD20E2A	Printed Circuit Board Assy	
IC201	YFCX10045	LSI	
IC202	AN2110S	IC	
IC203	AN2210SA	IC	
IC204	NJM4556M	IC	
Q201-203	2SK321-Q	FET	
Q204,205	2SC2404-CD	Transistor	
Q206	2SD601-Q	Transistor	
Q208	2SC2404-CD	Transistor	
D201	MA151A	Diode	
D202,203	0A91	Diode	
R201-203	YF2116202JT	Carbon	2K ohms 1/16W
R204	YF2116161JT	Carbon	160 ohms 1/16W
R205	YF2116221JT	Carbon	220 ohms 1/16W
R206	YF2116100JT	Carbon	10 ohms 1/16W
R207	YF2116102GT	Carbon	1K ohms 1/16W
R208	YF2116682JT	Carbon	6.8K ohms 1/16W
R209	YF2116101JT	Carbon	100 ohms 1/16W
R210	YF2116822JT	Carbon	8.2K ohms 1/16W
R211	YF2116182GT	Carbon	1.8K ohms 1/16W
R212	YF2116561JT	Carbon	560 ohms 1/16W
R213	YF2116102GT	Carbon	1K ohms 1/16W
R214	YF2116202JT	Carbon	2K ohms 1/16W
R215	YF2116221JT	Carbon	220 ohms 1/16W
R216	YF2116202JT	Carbon	2K ohms 1/16W
R217	YF2116102GT	Carbon	1K ohms 1/16W
R221	YF2116101JT	Carbon	100 ohms 1/16W
R222	YF2116122JT	Carbon	1.2K ohms 1/16W
R223	YF2116562GT	Carbon	5.6K ohms 1/16W
R224	YF2116471GT	Carbon	470 ohms 1/16W
R225	YF2116332GT	Carbon	3.3K ohms 1/16W
R226	YF2116123JT	Carbon	12K ohms 1/16W
R227	YF2116105GT	Carbon	1M ohms 1/16W
R228	YF2116824JT	Carbon	820K ohms 1/16W
R229	YF2116183GT	Carbon	18K ohms 1/16W
R230,231	YF2116102GT	Carbon	1K ohms 1/16W
R232	YF2116183GT	Carbon	18K ohms 1/16W
R233	YF2116102GT	Carbon	1K ohms 1/16W
R234,235	YF2116562JT	Carbon	5.6K ohms 1/16W
R236	YF2116223JT	Carbon	22K ohms 1/16W
R237	YF2116103JT	Carbon	10K ohms 1/16W
R238	YF2116681JT	Carbon	680 ohms 1/16W
R239	YF2116391JT	Carbon	390 ohms 1/16W
R240	YF2116222GT	Carbon	2.2K ohms 1/16W
R241	YF2116123JT	Carbon	12K ohms 1/16W
R242	YF2116562JT	Carbon	5.6K ohms 1/16W
R243	YF2116821GT	Carbon	820 ohms 1/16W
R244	YF2116562JT	Carbon	5.6K ohms 1/16W
R246	YF2116684JT	Carbon	680K ohms 1/16W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R247,248	YF2116103JT	Carbon	10K ohms 1/16W
R249	YF2116102GT	Carbon	1K ohms 1/16W
R250	YF2116333GT	Carbon	33K ohms 1/16W
R251	YF2116333GT	Carbon	33K ohms 1/16W
R252	YF2116223GT	Carbon	22K ohms 1/16W
R253	YF2116680JT	Carbon	68 ohms 1/16W
R254	YF2116562GT	Carbon	5.6K ohms 1/16W
R255	YF2116331GT	Carbon	330 ohms 1/16W
R256	YF2116332JT	Carbon	3.3K ohms 1/16W
R257	YF2116222GT	Carbon	2.2K ohms 1/16W
R260	YF21162R2JT	Carbon	2.2 ohms 1/16W
R261	YF2116102GT	Carbon	1K ohms 1/16W
R271	ERD10TJ563	Carbon	56K ohms 1/8W
VR202	YFH0522A1K	Variable Resistor	1K ohms
VR203	YFH0522A3R3K	Variable Resistor	3.3K ohms
VR204	YFH0522A1K	Variable Resistor	1K ohms
C201-203	YF400200CHJT	Ceramic	20 pF
C204	YF400104FZT	Ceramic	0.1 μF
C206	ECEA1CKS100	Electrolytic	10 μF 16V
C207	YF400104FZT	Ceramic	0.1 μF
C208,209	ECSF1CE226	Electrolytic	22 μF 16V
C210	ECEA1CKS220	Electrolytic	22 μF 16V
C213	ECEA1AKN470	Electrolytic	47 μF 10V
C214	ECEA1HKS4R7	Electrolytic	4.7 μF 50V
C215,216	YF400473FZT	Ceramic	0.047 μF
C217,218	YF400223FZT	Ceramic	0.022 μF
C219,220	YF400104FZT	Ceramic	0.1 μF
C221	ECEA0JU101	Electrolytic	100 μF 6.3V
C222	ECEA1CKS220	Electrolytic	22 μF 16V
C223	ECEA1CKS100	Electrolytic	10 μF 16V
C224,225	YF400473FZT	Ceramic	0.047 μF
C226	ECSF0JE156	Electrolytic	15 μF 6.3V
C227	ECEA1CKS330	Electrolytic	33 μF 16V
C228	ECEA1CKS220	Electrolytic	22 μF 16V
C229	ECEA1CKS100	Electrolytic	10 μF 16V
C230	YF400473FZT	Ceramic	0.047 μF
C233	ECEA1AKS470	Electrolytic	47 μF 10V
C234	YF400180CHJT	Ceramic	18 pF
C235	ECEA1CKS100	Electrolytic	10 μF 16V
C240	YF400122XKT	Ceramic	1200 pF
C241	ECSF1AE105	Electrolytic	1μF 10V
C242	YF400104FZT	Ceramic	0.1 μF
C250	ECCF1H330JC	Ceramic	33 pF 50V
C251	ECSF1CE105	Tantalum	1 μF 16V
L201-203	YFNL45T470K	Coil	47 μH
CF201	YFSLC821684	Filter	
CF203	YFSLC011A	Filter	
J201-203	YF21160R00T	Jumper Resistor	
E201,202	YW32BM7R5	Terminal	
M31	YFV2HA0331A4	Shield Parts	

LED BOARD

PCB2-2	oYFVKYCD20E2A	Printed Circuit Board Assy	
D250	LN238RPH	Diode	

SYM-BOL NO.	PART NO.	DESCRIPTION	
R270	YF2116222GT	Carbon	2.2K ohms 1/16W

POWER BOARD

PCB3	o YFVKYCD20P3A	Printed Circuit Board Assy	
IC301	YFSR8201	IC	
IC302	NJM78L20A	IC	
IC303	NJM79L05A	IC	
Q301,302	2SB819	Transistor	
Q303	2SD601-Q	Transistor	
Q304	2SD1081L-BC	Transistor	
Q305	2SC2404-CD	Transistor	
Q306	2SA1022-C	Transistor	
D301-303	SS1.5J4	Diode	
D304	MA151WK	Diode	
D305	SS1.5J4	Diode	
D311	MA151K	Diode	
R301	YF2116102GT	Carbon	1K ohms 1/16W
R302	YF2116331JT	Carbon	330 ohms 1/16W
R303	YF2116561JT	Carbon	560 ohms 1/16W
R304	YF2116332JT	Carbon	3.3K ohms 1/16W
R311	YF2116102GT	Carbon	1K ohms 1/16W
R312	YF2116562JT	Carbon	5.6K ohms 1/16W
R313	YF2116103JT	Carbon	10K ohms 1/16W
R320,321	YF2116471JT	Carbon	470 ohms 1/16W
R322	YF2116332JT	Carbon	3.3K ohms 1/16W
R323	ERD10TJ220	Carbon	22 ohms 1/8W
VR301	YFH0522A150K	Variable Resistor	150K ohms
C301	ECEA1EKG100	Electrolytic	10 μF 25V
C302	ECEA1EU221	Electrolytic	220 μF 25V
C303	ECEA1CU101	Electrolytic	100 μF 16V
C304,305	ECEA1CFS101	Electrolytic	100 μF 16V
C306	ECEA1CU101	Electrolytic	100 μF 16V
C307	ECEA1CSS221	Electrolytic	220 μF 16V
C308	ECEA1VKG100	Electrolytic	10 μF 35V
C309	ECSF1VE106	Tantalum	10 μF 35V
C310	YF400221CHJT	Ceramic	220 pF
C311	ECEA1HKG2R2	Electrolytic	2.2 μF 50V
C312	ECQM2392KZ	Plastic	3900 pF 200V
C313	ECEA1ESS101	Electrolytic	100 μF 25V
C314	ECSF1CE156	Electrolytic	15 μF 16V
C318,319	YF400104FZT	Metal	0.1 μF
C321	ECQV05104JZ	Ceramic	0.1 μF 50V
C322	YF400183XKT	Ceramic	0.018 μF
C323	ECEA1AKG470	Electrolytic	47 μF 10V
L301	YFFL9H470K	Coil	47 μH
L302	ELC10E001	Coil	120 μH
L303	YFFL7H470K	Coil	47 μH
L304	ELC09J001	Coil	120 μH
L305	YFFL7HP220K	Coil	22 μH
L306	YFMCT04910	Coil	90 μH

SYM-BOL NO.	PART NO.	DESCRIPTION
T301	YFMCT04913	Flyback Transformer
E1	YF910140-05	Terminal
M33	o YFV2HA0321A4	Shield Case A
M34	o YFV2HA0322A4	Shield Case B
M35	o YFV2HA0323A4	Shield Cover
M36	o YFV2PA0139A4	Insulator Cover
M37	o YFV2PA0140A4	Insulator Sheet A
M38	o YFV2PA0141A4	Insulator Sheet B

MOTHER BOARD

PCB4	oYFVKYCD20P4A	Printed Circuit Board Assy	
R401	ERD10TJ152	Carbon	1.5K ohms 1/8W
C401	ECSF1VE475	Tantalum	4.7 μF 35V
C404	ECSF1EE106	Tantalum	10 μF 25V
C405,406	ECEA0JU331	Electrolytic	330 μF 6.3V
C407,408	ECSF1AE106	Tantalum	10 μF 10V
C409	ECCF1H510JC	Ceramic	51 pF 50V
L401,402	YFBL1RN1A62	Coil	10 μH
CN(Process)	YF5870-12	Socket Pin	
CN(Power)	YF5870-5	Socket Pin (x3)	
CN401-JM	EMCS0250Z	2 pin Jack Male	
CN402-JM	EMCS0250Z	2 pin Jack Male	
CN403-JM	EMCS0450Z	4 pin Jack Male	
CN404-JM	EMCS0350Z	3 pin Jack Male	
CN405-JM	EMCS0650Z	6 pin Jack Male	

SUBPOWER BOARD

PCB5	o YFVKYCD20P5A	Printed Circuit Board Assy
IC311	MN4069BS	IC
IC312	MN4528BS	IC
CN1	YFIH10208	8 pin Connector

CCD BOARD

PCB6	oYFVKYCD20P6A	Printed Circuit Board Assy
Q101	2SD602-Q	Transistor
Q102	2SB710-Q	Transistor
Q103	2SD602-Q	Transistor
Q104	2SB710-Q	Transistor
Q105	2SD602-Q	Transistor
Q106	2SB710-Q	Transistor
Q107	2SD602-Q	Transistor
Q108	2SB710-Q	Transistor
Q109	2SD602-Q	Transistor
Q110	2SB710-Q	Transistor
Q111	2SD602-Q	Transistor
Q112	2SB710-Q	Transistor
Q113,114	2SD602-Q	Transistor
Q115	2SA1022-CD	Transistor
Q116,117	2SC2404-CD	Transistor
Q118,119	2SA1022-CD	Transistor
Q120,121	2SC2404-CD	Transistor
Q122,123	2SA1022-CD	Transistor
Q124,125	2SC2404-CD	Transistor
Q126	2SA1022-CD	Transistor
Q127	2SC2778-BCTW	Transistor
D101,104	MA151WK	Diode
D106	MA151WK	Diode
D107	MA151WA	Diode
D108	MA153	Diode
D109,111	MA151WK	Diode
D113	MA151WA	Diode
D114	MA151WK	Diode
C101	YF400104FZT	Ceramic 0.1 μF
C102	YF400682XKT	Ceramic 6800 pF
C103	YF400561SLKT	Ceramic 560 pF
C104	YF400682XKT	Ceramic 6800 pF
C105	YF400561SLKT	Ceramic 560 pF
C106,107	YF400104FZT	Ceramic 0.1 μF
C108	YF400561SLKT	Ceramic 560 pF
C109	YF400221CHJT	Ceramic 220 pF
C110	YF400561SLKT	Ceramic 560 pF
C111	YF400221CHJT	Ceramic 220 pF
C112	YF400561SLKT	Ceramic 560 pF
C113	YF400221CHJT	Ceramic 220 pF
C114	YF400104FZT	Ceramic 0.1 μF
C115	YF400102SLJT	Ceramic 1000 pF
C116	YF400221CHJT	Ceramic 220 pF
C117	ECSE1AT226R	Tantalum 22 μF 10V
C118	ECSE1VT685R	Tantalum 6.8 μF 35V
C119,120	YF400360CHJT	Ceramic 36 pF
C121	YF400102SLJT	Ceramic 1000 pF
C122,123	YF400360CHJT	Ceramic 36 pF
C124	YF400102SLJT	Ceramic 1000 pF
C125	YF400100CHDT	Ceramic 10 pF
C126	YF400220CHJT	Ceramic 22 pF
C127	YF400100CHDT	Ceramic 10 pF
C128	YF400102SLJT	Ceramic 1000 pF
C129-132	YF400104FZT	Ceramic 0.1 μF
C133	YF400100CHDT	Ceramic 10 pF
C134-137	YF400104FZT	Ceramic 0.1 μF
C138	YF400102SLJT	Ceramic 1000 pF
C140	YF400472XKT	Ceramic 4700 pF
C150	ECSF1CE475	Tantalum 4.7 μF 16V
C151	ECSF1HE105	Tantalum 1 μF 50V
J101	YF21160R00T	Jumper Resistor
CN101	YF0M20P	Socket Pin
E101	YFEDGCLP0815	Terminal Pin

AC-DC BOARD-2

PCB8		o P29013401ASY	Printed Circuit Board Assy
IC401		M5237L	IC
Q401	⚠	2SC3549	Transistor
Q402		2SB744	Transistor
D402	⚠	RU1P	Diode
D403		1SS55	Diode
D404	⚠	o RD6.2EB2	Diode
D405		1SS55	Diode

SYM-BOL NO.	PART NO.	DESCRIPTION	
D406	ERB12-04	Diode	
D407 ⚠	o ERA81-004	Diode	
R401 ⚠	o YFUEEB394BB	Carbon	390K ohms 1/2W
R402 ⚠	o YFM0S2TJ224	Carbon	220K ohms 2W
R403 ⚠	o YFUEEB821BB	Carbon	820 ohms 1/4W
R404 ⚠	o YFUEEC121AF	Carbon	120 ohms 2W
R407	o YFUEEB101BB	Carbon	100 ohms 1/4W
R408	o YFUEEB222BB	Carbon	2.2K ohms 1/4W
R409	o YFUEZ0196ZZ	Carbon	19M ohms 1/4W
R410	o YFUEEB332BB	Carbon	3.3K ohms 1/4W
R411	o YFUEZ0193ZZ	Carbon	19K ohms 1/4W
C403	o YFUIT2G100M	Electrolytic	10 μF 400V
C404	o YFUGAMR47BM	Electrolytic	0.47 μF 400V
C405	o YFUGFF682AR	Plastic	6800 pF
C406	o YFUGAC221BJ	Electrolytic	220 μF 16V
C408	o YFUGAD471BJ	Electrolytic	470 μF 25V
C409	o YFUGFF472AR	Plastic	4700 pF
C410	o YFUGAC221BJ	Electrolytic	220 μF 16V
C411	o YFUGCQ102AB	Ceramic	1000 pF
C412	o YFUGFF102AR	Plastic	1000 pF
PT401 ⚠	o YFPT-P06	Power Transformer	
CN1-JM	EMCS0250Z	2 pin Jack Male	
M41	o P2901-3301A	Insulator Case	
M42	o P2901-3302A	Insulator Cover A	
M43	o P2901-3303A	Insulator Cover B	
M44	o P2901-3101A	Mounting Angle for Board	

AC-DC BOARD-1

PCB9	o P29013402ASY	Printed Circuit Board Assy	
CP401 ⚠	YFSFH601G-2	Photo Coupler	
D401 ⚠	S1VB60	Diode	
D406	ERB12-04	Didoe	
R405	YFUEEB473BB	Carbon	47K ohms 1/4W
R406	YFUEBB472BB	Carbon	4.7K ohms 1/4W
C401	YFUGCZ472AF	Ceramic	4700 pF
C402	YFUGCQ102AB	Ceramic	1000 pF
C407	YFUGAF1R0BJ	Electrolytic	1 μF 50V
L401	YFFC-023	Line Filter	
F401 ⚠	UL.T630mA	Fuse	630mA 250V
E401	YFPU51212	Fuse Holder	
M45	o YF840620	Fuse Cover	

ACCESSORY PARTS/PACKAGING PARTS

CN10	YWRP97P4P	4 Pipn Lens Connector Plug
M51	o YFV8QA0973AN	Operating Instruction for WV-CD20/BCG
	o YFV8QA0974AN	Operating Instruction for WV-CD20N/AC
M53	19998700331	Warranty Card for WV-CD20/B
M56	YFV8PA0007A4	Hex-wrench
M57	YWT050803	Polyethylene Bag
M58	YWT20X35C03	Polyethylene Bag
M60	o YFV9CA0776AN	Packaging
M61	YNL1E	Packing Label for WV-CD20N/AC

SYM-BOL NO.	PART NO.	DESCRIPTION	

CCTV CAMERA WV-CD22

MISCELLANEOUS

IC1	CX021L	LSI B/W CCD Assy	
SW1	YFMFS201N	Slide Switch	
E1	YFVRZCD50P7A	Flexible Wire Assy	
CN2	YWRP97R4S	4 pin Lens Connector	
CN3 ~ 5	YWBNC-R	BNC Connector	
M1	o YFV5WA0250A4	Right Side Panel	
M2	o YFV5WA0252A4	Left Side Panel	
M3	o YFV5WB0251A4	Rear Panel	
M4	o YFV5EA0342A2	Cover	
M5	o YFV5BA0025A2	Front Escutcheon	
M6	o YFV5BA0026A3	Rear Escutcheon	
M7	o YFV2KA0131A3	Rear Chassis	
M8	YFIR2R5X16R5	Optical Filter	
M9	o YFV2CA0103A4	Hold Plate	
M10	o YFV2SA0219C3	Mounting Angle for Optical	
M11	o YFV2SA0220A4	Mounting Angle for ALC Connector	
M13	YFV2TA0020A3	Mounting Bracket	
M14	o YFV6FA0047A4	Bracket	
M15	o YFV2HA0316B4	Shield Parts	
M16	YFV2FA0101A4	Cushion for IR	
M17	o YFV2FA0113B4	Cushion A for Fix	
M18	o YFV4JA0115A4	Spring	
M20	YFV7MA0099A4	Caution Label	
M22	o YFV7QA1014A4	Main Label	
M23	o YFV2FA0125A4	Cushion B for Fix	
M24	YFV3FA0024A4	FB Control Ring	
M25	o YFV3FA0028A4	IR Cover Ring	
M28	YWBC-2B	Body Cap	

SYNC BOARD

PCB1	o YFVKYCD20E1A	Printed Circuit Board Assy	
IC101	MN1217A	LSI	
IC102	MN74HC02S	IC	
IC103	YFMB62H402	IC	
IC104	YFSC6433S	IC	
IC105	YFCX23047B	LSI	
IC107	MN4053BS	IC	
IC108	MN4069UBS	IC	
IC109	MN74HC04S	IC	
IC110	MN74HC74S	IC	
Q101	2SK198-Q	Transistor	
Q102	2SB710-Q	Transistor	
Q103	2SA1034-ST	Transistor	
Q104,105	2SC2405STU	Transistor	
Q106	2SA1034-ST	Transistor	
Q107	2SC2405STU	Transistor	
Q108	2SA1034-ST	Transistor	
D101	1SV73	Diode	
TH101	ERTD2FHK332S	Thermistor	3.3K ohms
R101	YF2116103JT	Carbon	10K ohms 1/16W
R102	YF2116821GT	Carbon	820 ohms 1/16W
R103	YF2116103JT	Carbon	10K ohms 1/16W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R104	YF2116106JT	Carbon	10M ohms 1/16W
R105	YF2116224JT	Carbon	220K ohms 1/16W
R106	YF2116332JT	Carbon	3.3K ohms 1/16W
R107	YF2116333GT	Carbon	33K ohms 1/16W
R108	YF2116101JT	Carbon	100 ohms 1/16W
R109	YF2116100JT	Carbon	10 ohms 1/16W
R112	YF2116103JT	Carbon	10K ohms 1/16W
R113	YF2116683GT	Carbon	68K ohms 1/16W
R114	YF2116100JT	Carbon	10 ohms 1/16W
R115	YF2116105GT	Carbon	1M ohms 1/16W
R116-118	YF2116103JT	Carbon	10K ohms 1/16W
R119,120	YF2116222GT	Carbon	2.2K ohms 1/16W
R121	YF2116103JT	Carbon	10K ohms 1/16W
R122	YF2116333GT	Carbon	33K ohms 1/16W
R123,124	YF2116102GT	Carbon	1K ohms 1/16W
R125-127	YF2116103JT	Carbon	10K ohms 1/16W
R128	YF2116821GT	Carbon	820 ohms 1/16W
R129,130	YF2116220JT	Carbon	22 ohms 1/16W
R131-133	YF2116562JT	Carbon	5.6K ohms 1/16W
R134	YF2116513JT	Carbon	51K ohms 1/16W
R135	YF2116332JT	Carbon	3.3K ohms 1/16W
R136,137	YF2116103JT	Carbon	10K ohms 1/16W
R138	YF2116750JT	Carbon	75 ohms 1/16W
R139	YF2116123JT	Carbon	12K ohms 1/16W
R140	YF2116104JT	Carbon	100K ohms 1/16W
R141	YF2116101JT	Carbon	100 ohms 1/16W
R142	YF2116682JT	Carbon	6.8K ohms 1/16W
R143,144	YF2116562JT	Carbon	5.6K ohms 1/16W
R145	YF2116472JT	Carbon	4.7K ohms 1/16W
R146	YF2116750JT	Carbon	75 ohms 1/16W
R147	YF2116222GT	Carbon	2.2K ohms 1/16W
R148	YF2116392JT	Carbon	3.9K ohms 1/16W
R149	YF2116472JT	Carbon	4.7K ohms 1/16W
R151	YF2116101JT	Carbon	100 ohms 1/16W
R152	YF2116331JT	Carbon	330 ohms 1/16W
R153	YF2116103JT	Carbon	10K ohms 1/16W
R154,155	YF2116560JT	Carbon	56 ohms 1/16W
R156	YF2116272JT	Carbon	2.7K ohms 1/16W
R157	YF2116395JT	Carbon	3.9M ohms 1/16W
R158	YF2116101JT	Carbon	100 ohms 1/16W
R160	YF2116332JT	Carbon	3.3K ohms 1/16W
R161	YF2116562JT	Carbon	5.6K ohms 1/16W
R162	YF2116123JT	Carbon	12K ohms 1/16W
R163-170	YF2116103JT	Carbon	10K ohms 1/16W
R171	YF2116220JT	Carbon	22 ohms 1/16W
R172	YF2116100JT	Carbon	10 ohms 1/16W
R173	YF2116103JT	Carbon	10K ohms 1/16W
R175	ERD10TJ272	Carbon	2.7K ohms 1/8W
R176	YF2116224JT	Carbon	220K ohms 1/16W
R178	ERS-A39J102	Thermal	1K ohms
R179	ERD10TJ122	Carbon	1.2K ohms 1/8W
VR101	YFH0522A1K	Variable Resistor	1K ohms
C101	YF400101CHJT	Ceramic	100 pF
C102	ECSE1CT226R	Electrolytic	22 µF 16V
C103	ECSF1CE226	Electrolytic	22 µF 16V
C104	ECSF1CE105	Electrolytic	1 µF 16V
C105	YF400150CHJT	Ceramic	15 pF

SYM-BOL NO.	PART NO.	DESCRIPTION	
C106	YF400470CHJT	Ceramic	47 pF
C107	YF400103FZT	Ceramic	0.01 µF
C108	YF400102XKT	Ceramic	1000 pF
C109	YF400100UJDT	Ceramic	10 pF
C110	YF400102XKT	Ceramic	1000 pF
C111	YF400470UJJT	Ceramic	47 pF
C112	YF400101CHJT	Ceramic	100 pF
C113	YF400683FZT	Ceramic	0.068 µF
C114	YF400103FZT	Ceramic	0.01 µF
C115	ECSE1VT105R	Electrolytic	1 µF 35V
C116	YF400104FZT	Ceramic	0.1 µF
C117	YF400101CHJT	Ceramic	100 pF
C118	YF400104FZT	Ceramic	0.1 µF
C119	YF400101CHJT	Ceramic	100 pF
C120	YF400104FZT	Ceramic	0.1 µF
C121	ECEA1CKS100	Electrolytic	10 µF 16V
C122	ECEA1HKS010	Electrolytic	1 µF 50V
C123	ECEA1AKS470	Electrolytic	47 µF 10V
C124	YF400104FZT	Ceramic	0.1 µF
C125,126	YF400300CHJT	Ceramic	30 pF
C127	YF400151CHJT	Ceramic	150 pF
C128	YF400104FZT	Ceramic	0.1 µF
C129	YF400510CHJT	Ceramic	51 pF
C130	YF400101CHJT	Ceramic	100 pF
C131	YF400103FZT	Ceramic	0.01 µF
C134,135	YF400080CHDT	Ceramic	8 pF
C136	ECSE1CT226R	Electrolytic	22 µF 16V
C137	ECSE1CT335SM	Electrolytic	3.3 µF 16V
C140	ELSF1CE105	Tantalum	1 µF 16V
C141	YF400030CHJT	Ceramic	3 pF
CT101	YFCTC6H20SC1	Trimmer Capacitor	20 pF
L101	NL4532T100K	Coil	10 µH
L102	NL32T2R2K	Coil	2.2 µH
L103	YFTKCD50	Coil	1 µH
L104	NL4532T100K	Coil	10 µH
L105	YFNL45T221K	Coil	220 µH
SW101,102	YFS-2011	Rotary Switch	
SW103	YWSSS21200	Slide Switch	
X101	YWBWVHS3125K	Crystal Oscillator	31.25KHz
J101	YF21160R00T	Jumper Resistor	
J150	YF21160R00T	Jumper Resistor	
E101,102	o YW32BM7R5	Terminal	
E103	YW32BM4R5	Terminal	

PROCESS BOARD

PCB2-1	o YFVKYCD20E2A	Printed Circuit Board Assy
IC201	YFCX10045	LSI
IC202	AN2110S	IC
IC203	AN2210SA	IC
IC204	NJM4556M	IC
Q201-203	2SK321-Q	FET
Q204,205	2SC2404-CD	Transistor
Q206	2SD601-Q	Transistor
Q208	2SC2404-CD	Transistor
D201	MA151A	Diode

SYM-BOL NO.	PART NO.	DESCRIPTION	
D202,203	0A91	Diode	
R201-203	YF2116202JT	Carbon	2K ohms 1/16W
R204	YF2116161JT	Carbon	160 ohms 1/16W
R205	YF2116221JT	Carbon	220 ohms 1/16W
R206	YF2116100JT	Carbon	10 ohms 1/16W
R207	YF2116102GT	Carbon	1K ohms 1/16W
R208	YF2116682JT	Carbon	6.8K ohms 1/16W
R209	YF2116101JT	Carbon	100 ohms 1/16W
R210	YF2116822JT	Carbon	8.2K ohms 1/16W
R211	YF2116182GT	Carbon	1.8K ohms 1/16W
R212	YF2116561JT	Carbon	560 ohms 1/16W
R213	YF2116102GT	Carbon	1K ohms 1/16W
R214	YF2116202JT	Carbon	2K ohms 1/16W
R215	YF2116221JT	Carbon	220 ohms 1/16W
R216	YF2116202JT	Carbon	2K ohms 1/16W
R217	YF2116102GT	Carbon	1K ohms 1/16W
R221	YF2116101JT	Carbon	100 ohms 1/16W
R222	YF2116122JT	Carbon	1.2K ohms 1/16W
R223	YF2116562GT	Carbon	5.6K ohms 1/16W
R224	YF2116471GT	Carbon	470 ohms 1/16W
R225	YF2116332GT	Carbon	3.3K ohms 1/16W
R226	YF2116123JT	Carbon	12K ohms 1/16W
R227	YF2116105GT	Carbon	1M ohms 1/16W
R228	YF2116824JT	Carbon	820K ohms 1/16W
R229	YF2116183GT	Carbon	18K ohms 1/16W
R230,231	YF2116102GT	Carbon	1K ohms 1/16W
R232	YF2116183GT	Carbon	18K ohms 1/16W
R233	YF2116102GT	Carbon	1K ohms 1/16W
R234,235	YF2116562JT	Carbon	5.6K ohms 1/16W
R236	YF2116223JT	Carbon	22K ohms 1/16W
R237	YF2116103JT	Carbon	10K ohms 1/16W
R238	YF2116681JT	Carbon	680 ohms 1/16W
R239	YF2116391JT	Carbon	390 ohms 1/16W
R240	YF2116222GT	Carbon	2.2K ohms 1/16W
R241	YF2116123JT	Carbon	12K ohms 1/16W
R242	YF2116562JT	Carbon	5.6K ohms 1/16W
R243	YF2116821GT	Carbon	820 ohms 1/16W
R244	YF2116562JT	Carbon	5.6K ohms 1/16W
R246	YF2116684JT	Carbon	680K ohms 1/16W
R247,248	YF2116103JT	Carbon	10K ohms 1/16W
R249	YF2116102GT	Carbon	1K ohms 1/16W
R250	YF2116333GT	Carbon	33K ohms 1/16W
R251	YF2116333GT	Carbon	33K ohms 1/16W
R252	YF2116223GT	Carbon	22K ohms 1/16W
R253	YF2116680JT	Carbon	68 ohms 1/16W
R254	YF2116562GT	Carbon	5.6K ohms 1/16W
R255	YF2116331GT	Carbon	330 ohms 1/16W
R256	YF2116332JT	Carbon	3.3K ohms 1/16W
R257	YF2116222GT	Carbon	2.2K ohms 1/16W
R260	YF21162R2JT	Carbon	2.2 ohms 1/16W
R261	YF2116102GT	Carbon	1K ohms 1/16W
R271	ERD10TJ563	Carbon	56K ohms 1/8W
VR202	YFH0522A1K	Variable Resistor	1K ohms
VR203	YFH0522A3R3K	Variable Resistor	3.3K ohms
VR204	YFH0522A1K	Variable Resistor	1K ohms
C201-203	YF400200CHJT	Ceramic	20 pF
C204	YF400104FZT	Ceramic	0.1 μF
C206	ECEA1CKS100	Electrolytic	10 μF 16V
C207	YF400104FZT	Ceramic	0.1 μF
C208,209	ECSF1CE226	Electrolytic	22 μF 16V
C210	ECEA1CKS220	Electrolytic	22 μF 16V
C213	ECEA1AKN470	Electrolytic	47 μF 10V
C214	ECEA1HKS4R7	Electrolytic	4.7 μF 50V
C215,216	YF400473FZT	Ceramic	0.047 μF
C217,218	YF400223FZT	Ceramic	0.022 μF
C219,220	YF400104FZT	Ceramic	0.1 μF
C221	ECEA0JU101	Electrolytic	100 μF 6.3V
C222	ECEA1CKS220	Electrolytic	22 μF 16V
C223	ECEA1CKS100	Electrolytic	10 μF 16V
C224,225	YF400473FZT	Ceramic	0.047 μF
C226	ECSF0JE156	Electrolytic	15 μF 6.3V
C227	ECEA1CKS330	Electrolytic	33 μF 16V
C228	ECEA1CKS220	Electrolytic	22 μF 16V
C229	ECEA1CKS100	Electrolytic	10 μF 16V
C230	YF400473FZT	Ceramic	0.047 μF
C233	ECEA1AKS470	Electrolytic	47 μF 10V
C234	YF400180CHJT	Ceramic	18 pF
C235	ECEA1CKS100	Electrolytic	10 μF 16V
C240	YF400122XKT	Ceramic	1200 pF
C241	**ECSF1AE105**	Electrolytic	**1 μF 10V**
C242	YF400104FZT	Ceramic	0.1 μF
C250	ECCF1H330JC	Ceramic	33 pF 50V
C251	**ECSF1CE105**	Tantalum	1 μF 16V
L201-203	YFNL45T470K	Coil	47 μH
CF201	**YFSLC821684**	Filter	
CF203	YFSLC011A	Filter	
J201-203	YF21160R00T	Jumper Resistor	
E201-202	**YW32BM7R5**	Terminal	
M31	YFV2HA0331A4	Shield Parts	

LED BOARD

PCB2-2	o YFVKYCD20P2A	Printed Circuit Board Assy	
D250	LN238RPH	Diode	
R270	YF2116222GT	Carbon	2.2K ohms 1/16W

POWER BOARD

PCB3	o YFVKYCD20P3A	Printed Circuit Board Assy	
IC301	YFSR8201	IC	
IC302	NJM78L20A	IC	
IC303	NJM79L05A	IC	
Q301,302	2SB819	Transistor	
Q303	2SD601-Q	Transistor	
Q304	2SD1081L-BC	Transistor	
Q305	2SC2404-CD	Transistor	
Q306	2SA1022-C	Transistor	
D301-303	SS1.5J4	Diode	
D304	MA151WK	Diode	
D305	SS1.5J4	Diode	
D311	MA151K	Diode	
R301	YF2116102GT	Carbon	1K ohms 1/16W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R302	YF2116331JT	Carbon	330 ohms 1/16W
R303	YF2116561JT	Carbon	560 ohms 1/16W
R304	YF2116332JT	Carbon	3.3K ohms 1/16W
R311	YF2116102GT	Carbon	1K ohms 1/16W
R312	YF2116562JT	Carbon	5.6K ohms 1/16W
R313	YF2116103JT	Carbon	10K ohms 1/16W
R320,321	YF2116471JT	Carbon	470 ohms 1/16W
R322	YF2116332JT	Carbon	3.3K ohms 1/16W
R323	ERD10TJ220	Carbon	22 ohms 1/8W
VR301	YFH0522A150K	Variable Resistor	150K ohms
C301	ECEA1EKG100	Electrolytic	10 μF 25V
C302	ECEA1EU221	Electrolytic	220 μF 25V
C303	ECEA1CU101	Electrolytic	100 μF 16V
C304,305	ECEA1CFS101	Electrolytic	100 μF 16V
C306	ECEA1CU101	Electrolytic	100 μF 16V
C307	ECEA1CSS221	Electrolytic	220 μF 16V
C308	ECEA1VKG100	Electrolytic	10 μF 35V
C309	ECSF1VE106	Tantalum	10 μF 35V
C310	YF400221CHJT	Ceramic	220 pF
C311	ECEA1HKG2R2	Electrolytic	2.2 μF 50V
C312	ECQM2392KZ	Plastic	3900 PF 200V
C313	ECEA1ESS101	Electrolytic	100 μF 25V
C314	ECSF1CE156	Electrolytic	15 μF 16V
C318,319	YF400104FZT	Ceramic	0.1 μF
C321	ECQV05104JZ	Metal	0.1 μF 50V
C322	YF400183XKT	Ceramic	0.018 μF
C323	ECEA1AKG470	Electrolytic	47 μF 10V
L301	YFFL9H470K	Coil	47 μH
L302	ELC10E001	Coil	120 μH
L303	YFFL7H470K	Coil	47 μH
L304	ELC09J001	Coil	120 μH
L305	YFFL7HP220K	Coil	22 μH
L306	YFMCT04910	Coil	90 μH
T301	YFMCT04913	Flyback Transformer	
E1	YF910140-05	Terminal	
M33	YFV2HA0321A4	Shield Case A	
M34	YFV2HA0322A4	Shield Case B	
M35	YFV2HA0323A4	Shield Cover	
M36	YFV2PA0139A4	Insulator Cover	
M37	YFV2PA0140A4	Insulator Sheet A	
M38	YFV2PA0141A4	Insulator Sheet B	

MOTHER BOARD

PCB4	oYFVKYCD20P4A	Printed Circuit Board Assy	
R401	ERD10TJ152	Carbon	1.5K ohms 1/8W
C401	ECSF1VE475	Tantalum	4.7 μF 35V
C404	ECSF1EE106	Tantalum	10 μF 25V
C405,406	ECEA0JU331	Electrolytic	330 μF 6.3V
C407,408	ECSF1AE106	Tantalum	10 μF 10V
C409	ECCF1H510JC	Ceramic	51 pF 50V
L401,402	YFBL1RN1A62	Coil	10 μH
CN(Process)	YF5870-12	Socket Pin	
CN(Power)	YF5870-5	Socket Pin (x3)	
CN401-JM	EMCS0250Z	2 pin Jack Male	
CN402-JM	EMCS0250Z	2 pin Jack Male	
CN403-JM	EMCS0450Z	4 pin Jack Male	
CN404-JM	EMCS0350Z	3 pin Jack Male	
CN405-JM	EMCS0650Z	6 pin Jack Male	

SUBPOWER BOARD

PCB5	o YFVKYCD20P5A	Printed Circuit Board Assy
IC311	MN4069BS	IC
IC312	MN4528BS	IC
CN1	YFIH10208	8 pin Connector

CCD BOARD

PCB6	o YFVKYCD20P6A	Printed Circuit Board Assy	
Q101	2SD602-Q	Transistor	
Q102	2SB710-Q	Transistor	
Q103	2SD602-Q	Transistor	
Q104	2SB710-Q	Transistor	
Q105	2SD602-Q	Transistor	
Q106	2SB710-Q	Transistor	
Q107	2SD602-Q	Transistor	
Q108	2SB710-Q	Transistir	
Q109	2SD602-Q	Transistor	
Q110	2SB710-Q	Transistor	
Q111	2SD602-Q	Transistor	
Q112	2SB710-Q	Transistor	
Q113,114	2SD602-Q	Transistor	
Q115	2SA1022-CD	Transistor	
Q116,117	2SC2404-CD	Transistor	
Q118,119	2SA1022-CD	Transistor	
Q120,121	2SC2404-CD	Transistor	
Q122,123	2SA1022-CD	Transistor	
Q124,125	2SC2404-CD	Transistor	
Q126	2SA1022-CD	Transistor	
Q127	2SC2778-BCTW	Transistor	
D101,104	MA151WK	Diode	
D106	MA151WK	Diode	
D107	MA151WA	Diode	
D108	MA153	Diode	
D109,111	MA151WK	Diode	
D113	MA151WA	Diode	
D114	MA151WK	Diode	
C101	YF400104FZT	Ceramic	0.1 μF
C102	YF400682XKT	Ceramic	6800 pF
C103	YF400561SLKT	Ceramic	560 pF
C104	YF400682XKT	Ceramic	6800 pF
C105	YF400561SLKT	Ceramic	560 pF
C106,107	YF400104FZT	Ceramic	0.1 μF
C108	YF400561SLKT	Ceramic	560 pF
C109	YF400221CHJT	Ceramic	220 pF
C110	YF400561SLKT	Ceramic	560 pF
C111	YF400221CHJT	Ceramic	220 pF
C112	YF400561SLKT	Ceramic	560 pF
C113	YF400221CHJT	Ceramic	220 pF
C114	YF400104FZT	Ceramic	0.1 μF
C115	YF400102SLJT	Ceramic	1000 pF
C116	YF400221CHJT	Ceramic	220 pF
C117	ECSE1AT226R	Electrolytic	22 μF 4V

SYM-BOL NO.	PART NO.	DESCRIPTION
C118	ECSE1VT685R	Electrolytic 6.8 μF 35V
C119,120	YF400360CHJT	Ceramic 36 pF
C121	YF400102SLJT	Ceramic 1000 pF
C122,123	YF400360CHJT	Ceramic 36 pF
C124	YF400102SLJT	Ceramic 1000 pF
C125	YF400100CHDT	Ceramic 10 pF
C126	YF400220CHJT	Ceramic 22 pF
C127	YF400100CHDT	Ceramic 10 pF
C128	YF400102SLJT	Ceramic 1000 pF
C129-132	YF400104FZT	Ceramic 0.1 μF
C133	YF400100CHDT	Ceramic 10 pF
C134-137	YF400104FZT	Ceramic 0.1 μF
C138	YF400102SLJT	Ceramic 1000 pF
C140	YF400472XKT	Ceramic 4700 pF
C150	ECSF1CE475	Tantalum 4.7 μF 16V
C151	ECSF1HE105	Tantalum 1 μF 50V
J101	YF21160R00T	Jumper Resistor
CN101	YF0M20P	Socket Pin
E101	EDGCLP0815	Terminal

TERMINAL BOARD

PCB8	oYFVKZCD20P1A	Printed Circuit Board Assy
F1	YFSP7800	Current Fuse 800mA 125V
E1	YFULP301A2	Terminal

ACCESSORY PARTS/PACKAGING PARTS

CN10	YWRP97P4P	4 Pipn Lens Connector Plug
M51	oYFV8QA972AN	Operating Instruction
M56	YFV8PA0007A4	Hex-wrench
M57	YWT050803	Polyethylene Bag
M58	YWT20X35C03	Polyethylene Bag
M59	YWT20X25C03	Polyethylene Bag
M60	oYFV9CA0758AN	Packaging
M61	YFV8FA0070A4	Packaging Label A
M62	YFV8FA0002A4	Packaging Label B

SYM-BOL NO.	PART NO.	DESCRIPTION

CCTV CAMERA WV-CD24

MISCELLANEOUS

IC1	CX021L	LSI B/W CCD Assy
SW1	YFMFS201N	Camera ON/OFF Switch
SW2	YFSW6780102	Sync Selector Switch
E1	YFVRZCD50P7A	Flexible Wire Assy
CN2	YWRP97R4S	Connector
CN3~5	YWBNC-R	BNC Connector
M1	oYFV5WB0253A4	Right Side Panel for WV-CD24E
	oYFV5WD0253A4	Right Side Panel for WV-CD24N/AC
M2	oYFV5WA0254A4	Left Side Panel for WV-CD24E
	oYFV5WB0254A4	Left Side Panel for WV-CD24N/AC
M3	o YFV5WA0256A4	Rear Panel
M4	o YFV5EA0350A2	Cover
M5	o YFV5BA0025A2	Front Escutcheon
M6	o YFV5BA0026A3	Rear Escutcheon
M7	o YFV2KA0131A3	Rear Chassis
M8	YFIR2R5X16R5	Optional Filter
M9	o YFV2CA0103A4	Hold Plate
M10	o YFV2SA0219C3	Mounting Angle for Optical
M11	o YFV2SA0220A4	Mounting Angle for ALC Connector
M12	o YFV2SA0223A3	Mounting Angle for Power
M13	YFV2TA0020A3	Mounting Bracket
M14	o YFV6FA0047A4	Bracket
M15	o YFV2HA0316B4	Shield Parts
M16 ⚠	YFV2FA0101A4	Cushion for IR
M17 ⚠	oYFV2FA0113B4	Cushion A for Fix
M18	o YFV4JA0115A4	Spring
M20 ⚠	YFV7MA0099A4	Caution Label
M21 ⚠	oYFV7MA0120A4	Fuse Extension Label
M22 ⚠	oYFV7QA1015A4	Main Label for WV-CD24E
	oYFV7QA1016A4	Main Label for WV-CD24N/AC
M23 ⚠	YW-BCG-EM01	Earth Lag
M24	YFV2FA0125A4	Cushion B for Fix
M26	YFV3FA0024A4	FB Control Ring
M27	YFV3FA0028A4	IR Cover Ring
M28	YWBC-2B	Cap

SYNC BOARD

PCB1	oYFVKYCD20E1A	Printed Circuit Board Assy
IC101	MN1217A	LSI
IC102	MN74HC02S	IC
IC103	YFMB62H402	IC
IC104	YFSC6433S	IC
IC105	YFCX23047B	LSI
IC107	MN4053BS	IC
IC108	MN4069UBS	IC
IC109	MN74HC04S	IC
IC110	MN74HC74S	IC
Q101	2SK198-Q	Transistor
Q102	2SB710-Q	Transistor
Q103	2SA1034-ST	Transistor
Q104,105	2SC2405STU	Transistor
Q106	2SA1034-ST	Transistor
Q107	2SC2405STU	Transistor
Q108	2SA1034-ST	Transistor

SYM-BOL NO.	PART NO.	DESCRIPTION	
D101	1SV73	Diode	
TH101	ERTD2FHK332S	Thermistor	3.3K ohms
R101	YF2116103JT	Carbon	10K ohms 1/16W
R102	YF2116821GT	Carbon	820 ohms 1/16W
R103	YF2116103JT	Carbon	10K ohms 1/16W
R104	YF2116106JT	Carbon	10M ohms 1/16W
R105	YF2116224JT	Carbon	220K ohms 1/16W
R106	YF2116332JT	Carbon	3.3K ohms 1/16W
R107	YF2116333GT	Carbon	33K ohms 1/16W
R108	YF2116101JT	Carbon	100 ohms 1/16W
R109	YF2116100JT	Carbon	10 ohms 1/16W
R112	YF2116103JT	Carbon	10K ohms 1/16W
R113	YF2116683GT	Carbon	68K ohms 1/16W
R114	YF2116100JT	Carbon	10 ohms 1/16W
R115	YF2116105GT	Carbon	1M ohms 1/16W
R116-118	YF2116103JT	Carbon	10K ohms 1/16W
R119,120	YF2116222GT	Carbon	2.2K ohms 1/16W
R121	YF2116103JT	Carbon	10K ohms 1/16W
R122	YF2116333GT	Carbon	33K ohms 1/16W
R123,124	YF2116102GT	Carbon	1K ohms 1/16W
R125-127	YF2116103JT	Carbon	10K ohms 1/16W
R128	YF2116821GT	Carbon	820 ohms 1/16W
R129,130	YF2116220JT	Carbon	22 ohms 1/16W
R131-133	YF2116562JT	Carbon	5.6K ohms 1/16W
R134	YF2116513JT	Carbon	51K ohms 1/16W
R135	YF2116332JT	Carbon	3.3K ohms 1/16W
R136,137	YF2116103JT	Carbon	10K ohms 1/16W
R138	YF2116750JT	Carbon	75 ohms 1/16W
R139	YF2116123JT	Carbon	12K ohms 1/16W
R140	YF2116104JT	Carbon	100K ohms 1/16W
R141	YF2116101JT	Carbon	100 ohms 1/16W
R142	YF2116682JT	Carbon	6.8K ohms 1/16W
R143,144	YF2116562JT	Carbon	5.6K ohms 1/16W
R145	YF2116472JT	Carbon	4.7K ohms 1/16W
R146	YF2116750JT	Carbon	75 ohms 1/16W
R147	YF2116222GT	Carbon	2.2K ohms 1/16W
R148	YF2116392JT	Carbon	3.9K ohms 1/16W
R149	YF2116472JT	Carbon	4.7K ohms 1/16W
R151	YF2116101JT	Carbon	100 ohms 1/16W
R152	YF2116331JT	Carbon	330 ohms 1/16W
R153	YF2116103JT	Carbon	10K ohms 1/16W
R154,155	YF2116560JT	Carbon	56 ohms 1/16W
R156	YF2116272JT	Carbon	2.7K ohms 1/16W
R157	YF2116395JT	Carbon	3.9M ohms 1/16W
R158	YF2116101JT	Carbon	100 ohms 1/16W
R160	YF2116332JT	Carbon	3.3K ohms 1/16W
R161	YF2116562JT	Carbon	5.6K ohms 1/16W
R162	YF2116123JT	Carbon	12K ohms 1/16W
R163-170	YF2116103JT	Carbon	10K ohms 1/16W
R171	YF2116220JT	Carbon	22 ohms 1/16W
R173	YF2116103JT	Carbon	10K ohms 1/16W
R172	YF2116100JT	Carbon	10 ohms 1/16W
R175	ERD10TJ272	Carbon	2.7K ohms 1/8W
R176	YF2116224JT	Carbon	220K ohms 1/16W
R178	ERS-A39J102	Themal	1K ohms
R179	ERD10TJ122	Carbon	1.2K ohms 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION	
VR101	YFH0522A1K	Variable Resistor	1K ohms
C101	YF400101CHJT	Ceramic	100 pF
C102	ECSE1CT226R	Electrolytic	22 uF 16V
C103	ECSF1CE226	Electrolytic	22μF 16V
C104	ECSF1CE105	Electrolytic	1μF 16V
C105	YF400150CHJT	Ceramic	15 pF
C106	YF400470CHJT	Ceramic	47 pF
C107	YF400103FZT	Ceramic	0.01μF
C108	YF400102XKT	Ceramic	1000 pF
C109	YF400100UJDT	Ceramic	10 pF
C110	YF400102XKT	Ceramic	1000 pF
C111	YF400470UJJT	Ceramic	47 pF
C112	YF400101CHJT	Ceramic	100 pF
C113	YF400683FZT	Ceramic	0.068 uF
C114	YF400103FZT	Ceramic	0.01μF
C115	ECSE1VT105R	Electrolytic	1μF 35V
C116	YF400104FZT	Ceramic	0.1μF
C117	YF400101CHJT	Ceramic	100 pF
C118	YF400104FZT	Ceramic	0.1μF
C119	YF400101CHJT	Ceramic	100 pF
C120	YF400104FZT	Ceramic	0.1μF
C121	ECEA1CKS100	Electrolytic	10μF 16V
C122	ECEA1HKS010	Electrolytic	1μF 50V
C123	ECEA1AKS470	Electrolytic	47μF 10V
C124	YF400104FZT	Ceramic	0.1μF
C125,126	YF400300CHJT	Ceramic	30 pF
C127	YF400151CHJT	Ceramic	150 pF
C128	YF400104FZT	Ceramic	0.1μF
C129	YF400510CHJT	Ceramic	51 pF
C130	YF400101CHJT	Ceramic	100 pF
C131	YF400103FZT	Ceramic	0.01μF
C134,135	YF400080CHDT	Ceramic	8 pF
C136	ECSE1CT226R	Electrolytic	22μF 16V
C137	ECSE1CT335SM	Electrolytic	3.3μF 16V
C140	ELSF1CE105	Tantalum	1μF 16V
C141	YF400030CHJT	Ceramic	3 pF
CT101	YFCTC6H20SC1	Trimmer Capacitor	20 pF
L101	NL4532T100K	Coil	10μH
L102	NL32T2R2K	Coil	2.2μH
L103	YFTKCD50	Coil	1μH
L104	NL4532T100K	Coil	10μH
L105	YFNL45T221K	Coil	220μH
SW101,102	YFS-2011	Rotary Switch	
SW103	YWSSS21200	Slide Switch	
X101	YWBWVHS3125K	Crystal Oscillator	31.25KHz
J101	YF21160R00T	Jumper Resistor	
J150	YF21160R00T	Jumper Resistor	
E101,102	YW32BM7R5	Terminal	
E103	YW32BM4R5	Terminal	

PROCESS BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION	
PCB2-1	oYFVKYCD20E2A	Printed Circuit Board Assy	
IC201	YFCX10045	LSI	
IC202	AN2110S	IC	
IC203	AN2210SA	IC	
IC204	NJM4556M	IC	
Q201-203	2SK321-Q	FET	
Q204,205	2SC2404-CD	Transistor	
Q206	2SD601-Q	Transistor	
Q208	2SC2404-CD	Transistor	
D201	MA151A	Diode	
D202,203	0A91	Diode	
R201-203	YF2116202JT	Carbon	2K ohms 1/16W
R204	YF2116161JT	Carbon	160 ohms 1/16W
R205	YF2116221JT	Carbon	220 ohms 1/16W
R206	YF2116100JT	Carbon	10 ohms 1/16W
R207	YF2116102GT	Carbon	1K ohms 1/16W
R208	YF2116682JT	Carbon	6.8K ohms 1/16W
R209	YF2116101JT	Carbon	100 ohms 1/16W
R210	YF2116822JT	Carbon	8.2K ohms 1/16W
R211	YF2116182GT	Carbon	1.8K ohms 1/16W
R212	YF2116561JT	Carbon	560 ohms 1/16W
R213	YF2116102GT	Carbon	1K ohms 1/16W
R214	YF2116202JT	Carbon	2K ohms 1/16W
R215	YF2116221JT	Carbon	220 ohms 1/16W
R216	YF2116202JT	Carbon	2K ohms 1/16W
R217	YF2116102GT	Carbon	1K ohms 1/16W
R221	YF2116101JT	Carbon	100 ohms 1/16W
R222	YF2116122JT	Carbon	1.2K ohms 1/16W
R223	YF2116562GT	Carbon	5.6K ohms 1/16W
R224	YF2116471GT	Carbon	470 ohms 1/16W
R225	YF2116332GT	Carbon	3.3K ohms 1/16W
R226	YF2116123JT	Carbon	12K ohms 1/16W
R227	YF2116105GT	Carbon	1M ohms 1/16W
R228	YF2116824JT	Carbon	820K ohms 1/16W
R229	YF2116183GT	Carbon	18K ohms 1/16W
R230,231	YF2116102GT	Carbon	1K ohms 1/16W
R232	YF2116183GT	Carbon	18K ohms 1/16W
R233	YF2116102GT	Carbon	1K ohms 1/16W
R234,235	YF2116562JT	Carbon	5.6K ohms 1/16W
R236	YF2116223JT	Carbon	22K ohms 1/16W
R237	YF2116103JT	Carbon	10K ohms 1/16W
R238	YF2116681JT	Carbon	680 ohms 1/16W
R239	YF2116391JT	Carbon	390 ohms 1/16W
R240	YF2116222GT	Carbon	2.2K ohms 1/16W
R241	YF2116123JT	Carbon	12K ohms 1/16W
R242	YF2116562JT	Carbon	5.6K ohms 1/16W
R243	YF2116821GT	Carbon	820 ohms 1/16W
R244	YF2116562JT	Carbon	5.6K ohms 1/16W
R246	YF2116684JT	Carbon	680K ohms 1/16W
R247,248	YF2116103JT	Carbon	10K ohms 1/16W
R249	YF2116102GT	Carbon	1K ohms 1/16W
R250	YF2116333GT	Carbon	33K ohms 1/16W
R251	YF2116333GT	Carbon	33K ohms 1/16W
R252	YF2116223GT	Carbon	22K ohms 1/16W
R253	YF2116680JT	Carbon	68 ohms 1/16W
R254	YF2116562GT	Carbon	5.6K ohms 1/16W
R255	YF2116331GT	Carbon	330 ohms 1/16W
R256	YF2116332JT	Carbon	3.3K ohms 1/16W
R257	YF2116222GT	Carbon	2.2K ohms 1/16W
R260	YF21162R2JT	Carbon	2.2 ohms 1/16W
R261	YF2116102GT	Carbon	1K ohms 1/16W
R271	ERD10TJ563	Carbon	56K ohms 1/8W
VR202	YFH0522A1K	Variable Resistor	1K ohms
VR203	YFH0522A3R3K	Variable Resistor	3.3K ohms
VR204	YFH0522A1K	Variable Resistor	1K ohms
C201-203	YF400200CHJT	Ceramic	20 pF
C204	YF400104FZT	Ceramic	0.1 μF
C206	ECEA1CKS100	Electrolytic	10 μF 16V
C207	YF400104FZT	Ceramic	0.1 μF
C208,209	ECSF1CE226	Electrolytic	22 μF 16V
C210	ECEA1CKS220	Electrolytic	22 μF 16V
C213	ECEA1AKN470	Electrolytic	47 μF 10V
C214	ECEA1HKS4R7	Electrolytic	4.7 μF 50V
C215,216	YF400473FZT	Ceramic	0.047 μF
C217,218	YF400223FZT	Ceramic	0.022 μF
C219,220	YF400104FZT	Ceramic	0.1 μF
C221	ECEA0JU101	Electrolytic	100 μF 6.3V
C222	ECEA1CKS220	Electrolytic	22 μF 16V
C223	ECEA1CKS100	Electrolytic	10 μF 16V
C224,225	YF400473FZT	Ceramic	0.047 μF
C226	ECSF0JE156	Electrolytic	15 μF 6.3V
C227	ECEA1CKS330	Electrolytic	33 μF 16V
C228	ECEA1CKS220	Electrolytic	22 μF 16V
C229	ECEA1CKS100	Electrolytic	10 μF 16V
C230	YF400473FZT	Ceramic	0.047 μF
C233	ECEA1AKS470	Electrolytic	47 μF 10V
C234	YF400180CHJT	Ceramic	18 pF
C235	ECEA1CKS100	Electrolytic	10 μF 16V
C240	YF400122XKT	Ceramic	1200 pF
C241	ECSF1AE105	Electrolytic	1 μF 10V
C242	YF400104FZT	Ceramic	0.1 μF
C250	ECCF1H330JC	Ceramic	33 pF 50V
C251	ECSF1CE105	Tantalum	1 μF 16V
L201-203	YFNL45T470K	Coil	47 μH
CF201	YFSLC821684	Filter	
CF203	YFSLC011A	Filter	
J201-203	YF21160R00T	Jumper Resistor	
E201,202	YW32BM7R5	Terminal	
M31	YFV2HA0331A4	Shield Parts	

LED BOARD

PCB2-2	o YFVKYCD20P2A	Printed Circuit Board Assy	
D250	LN238RPH	Diode	
R270	YF2116222GT	Carbon	2.2K ohms 1/16W

POWER BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION	
PCB3	o YFVKYCD20P3A	Printed Circuit Board Assy	
IC301	YFSR8201	IC	
IC302	NJM78L20A	IC	
IC303	NJM79L05A	IC	
Q301,302	2SB819	Transistor	
Q303	2SD601-Q	Transistor	
Q304	2SD1081L-BC	Transistor	
Q305	2SC2404-CD	Transistor	
Q306	2SA1022-C	Transistor	
D301-303	SS1.5J4	Diode	
D304	MA151WK	Diode	
D305	SS1.5J4	Diode	
D311	MA151K	Diode	
R301	YF2116102GT	Carbon	1K ohms 1/16W
R302	YF2116331JT	Carbon	330 ohms 1/16W
R303	YF2116561JT	Carbon	560 ohms 1/16W
R304	YF2116332JT	Carbon	3.3K ohms 1/16W
R311	YF2116102GT	Carbon	1K ohms 1/16W
R312	YF2116562JT	Carbon	5.6K ohms 1/16W
R313	YF2116103JT	Carbon	10K ohms 1/16W
R320,321	YF2116471JT	Carbon	470 ohms 1/16W
R322	YF2116332JT	Carbon	3.3K ohms 1/16W
R323	**ERD10TJ220**	**Carbon**	**22 ohms 1/8W**
VR301	**YFH0522A150K**	**Variable Resistor**	**150K ohms**
C301	**ECEA1EKG100**	**Electrolytic**	**10 μF 25V**
C302	ECEA1EU221	Electrolytic	220 μF 25V
C303	ECEA1CU101	Electrolytic	100 μF 16V
C304,305	ECEA1CFS101	Electrolytic	100 μF 16V
C306	ECEA1CU101	Electrolytic	100 μF 16V
C307	ECEA1CSS221	Electrolytic	220 μF 16V
C308	ECEA1VKG100	Electrolytic	10 μF 35V
C309	ECSF1VE106	Tantalum	10 μF 35V
C310	YF400221CHJT	Ceramic	220 pF
C311	ECEA1HKG2R2	Electrolytic	2.2 μF 50V
C312	**ECQM2392KZ**	**Plastic**	**3900 pF 200V**
C313	ECEA1ESS101	Electrolytic	100 μF 25V
C314	ECSF1CE156	Electrolytic	15 μF 16V
C318,319	YF400104FZT	Ceramic	0.1 μF
C321	**ECQV05104JZ**	**Metal**	**0.1 μF 50V**
C322	**YF400183XKT**	**Ceramic**	**0.018 μF**
C323	ECEA1AKG470	Electrolytic	47 μF 10V
L301	YFFL9H470K	Coil	47 μH
L302	ELC10E001	Coil	120 μH
L303	YFFL7H470K	Coil	47 μH
L304	ELC09J001	Coil	120 μH
L305	YFFL7HP220K	Coil	22 μH
L306	YFMCT04910	Coil	90 μH
T301	YFMCT04913	Flyback Transformer	
E1	**YF910140-05**	Terminal	
M33	YFV2HA0321A4	Shield Case A	
M34	YFV2HA0322A4	Shield Case B	
M35	YFV2HA0323A4	Shield Cover	
M36	YFV2PA0139A4	Insulator Cover	
M37	YFV2PA0140A4	Insulator Sheet A	
M38	YFV2PA0141A4	Insulator Sheet B	

MOTHER BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION	
PCB4	**oYFVKYCD20P4A**	Printed Circuit Board Assy	
R401	**ERD10TJ152**	Carbon	1.5K ohms 1/8W
C401	**ECSF1VE475**	Tantalum	4.7 μF 35V
C404	**EVSF1EE106**	Tantalum	10 μF 25V
C405,406	**ECEA0JU331**	Electrolytic	330 μF 6.3V
C407,408	**ECSF1AE106**	Tantalum	10 μF 10V
C409	**ECCF1H510JC**	Ceramic	51 pF 50V
L401,402	YFBL1RN1A62	Coil	10 μH
CN(Process)	YF5870-12	Socket Pin	
CN(Power)	YF5870-5	Socket Pin (x3)	
CN401-JM	EMCS0250Z	2 pin Jack Male	
CN402-JM	EMCS0250Z	2 pin Jack Male	
CN403-JM	EMCS0450Z	4 pin Jack Male	
CN404-JM	EMCS0350Z	3 pin Jack Male	
CN405-JM	EMCS0650Z	6 pin Jack Male	

SUBPOWER BOARD

PCB5	o YFVKYCD20P5A	Printed Circuit Board Assy	
IC311	MN4069BS	IC	
IC312	MN4528BS	IC	
CN1	YFIH10208	8 pin Connector	

CCD BOARD

PCB6	**oYFVKYCD20P6A**	Printed Circuit Board Assy	
Q101	2SD602-Q	Transistor	
Q102	2SB710-Q	Transistor	
Q103	2SD602-Q	Transistor	
Q104	2SB710-Q	Transistor	
Q105	2SD602-Q	Transistor	
Q106	2SB710-Q	Transistor	
Q107	2SD602-Q	Transistor	
Q108	2SB710-Q	Transistor	
Q109	2SD602-Q	Transistor	
Q110	2SB710-Q	Transistor	
Q111	2SD602-Q	Transistor	
Q112	2SB710-Q	Transistor	
Q113,114	2SD602-Q	Transistor	
Q115	2SA1022-CD	Transistor	
Q116,117	2SC2404-CD	Transistor	
Q118,119	2SA1022-CD	Transistor	
Q120,121	2SC2404-CD	Transistor	
Q122,123	2SA1022-CD	Transistor	
Q124,125	2SC2404-CD	Transistor	
Q126	2SA1022-CD	Transistor	
Q127	2SC2778-BCTW	Transistor	
D101,104	MA151WK	Diode	
D106	MA151WK	Diode	
D107	MA151WA	Diode	
D108	MA153	Diode	
D109,111	MA151WK	Diode	
D113	MA151WA	Diode	
D114	MA151WK	Diode	
C101	YF400104FZT	Ceramic	0.1 μF

SYM-BOL NO.	PART NO.	DESCRIPTION	
C102	YF400682XKT	Ceramic	6800 pF
C103	YF400561SLKT	Ceramic	560 pF
C104	YF400682XKT	Ceramic	6800 pF
C105	YF400561SLKT	Ceramic	560 pF
C106,107	YF400104FZT	Ceramic	0.1 μF
C108	YF400561SLKT	Ceramic	560 pF
C109	YF400221CHJT	Ceramic	220 pF
C110	YF400561SLKT	Ceramic	560 pF
C111	YF400221CHJT	Ceramic	220 pF
C112	YF400561SLKT	Ceramic	560 pF
C113	YF400221CHJT	Ceramic	220 pF
C114	YF400104FZT	Ceramic	0.1 μF
C115	YF400102SLJT	Ceramic	1000 pF
C116	YF400221CHJT	Ceramic	220 pF
C117	ECSE1AT226R	Tantalum	22 μF 10V
C118	ECSE1VT685R	Tantalum	6.8 μF 35V
C119,120	YF400360CHJT	Ceramic	36 pF
C121	YF400102SLJT	Ceramic	1000 pF
C122,123	YF400360CHJT	Ceramic	36 pF
C124	YF400102SLJT	Ceramic	1000 pF
C125	YF400100CHDT	Ceramic	10 pF
C126	YF400220CHJT	Ceramic	22 pF
C127	YF400100CHDT	Ceramic	10 pF
C128	YF400102SLJT	Ceramic	1000 pF
C129-132	YF400104FZT	Ceramic	0.1 μF
C133	YF400100CHDT	Ceramic	10 pF
C134-137	YF400104FZT	Ceramic	0.1 μF
C138	YF400102SLJT	Ceramic	1000 pF
C140	YF400472XKT	Ceramic	4700 pF
C150	ECSF1CE475	Tantalum	4.7 μF 16V
C151	ECSF1HE105	Tantalum	1 μF 50V
J101	YF21160R00T	Jumper Resistor	
CN101	YF0M20P	Socket Pin	

TERMINAL BOARD

PCB7	o YFVKZCD24P1A	Printed Circuit Board Assy	
E1	YFULP301A3	Terminal	
E2	YFAV1.25B3A	Terminal Pin	

AC-DC BOARD-2

PCB8	o P29013401ASY	Printed Circuit Board Assy	
IC401	M5237L	IC	
Q401 ⚠	2SC2334	Transistor	
Q402	2SB744	Transistor	
D402 ⚠	o ES1A	Diode	
D403	o 1SS55	Diode	
D404 ⚠	o RD6.2EB2	Diode	
D405	1SS55	Diode	
D407 ⚠	o ERA81-004	Diode	
D408	1SS55	Diode	
D409	o RD33EB1	Diode	
R401 ⚠	o YFR1/2PT562J	Carbon	5.6K ohms 1/2W
R402 ⚠	o YFM0S1J103	Carbon	10K ohms 1W
R403 ⚠	o YFR1/2PT820J	Carbon	82 ohms 1/2W
R404 ⚠	o YFUEEC121AF	Carbon	120 ohms 2W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R407	o YFUEEB101BB	Carbon	100 ohms 1/4W
R408	o YFUEEB222BB	Carbon	2.2K ohms 1/4W
R409	o YFUEZ0196ZZ	Carbon	19M ohms 1/4W
R410	o YFUEEB332BB	Carbon	3.3K ohms 1/4W
R411	o YFUEZ0193ZZ	Carbon	19K ohms 1/4W
C403	o YFUGAF471BM	Electrolytic	470 μF 250V
C404	o YFUGAMR47BM	Electrolytic	0.47 μF 400V
C405	o YFUGFF224AR	Plastic	0.22 μF
C406	o YFUGAC221BJ	Electrolytic	220 μF 16V
C408	o YFUGAD471BJ	Electrolytic	470 μF 25V
C409	o YFUGFF472AR	Plastic	4700 pF
C410	o YFUGAC221BJ	Electrolytic	220 μF 16V
PT401 ⚠	o YFPT-49	Power Transformer	
CN1-JM	EMCS0250Z	2 pin Jack Male	
M41	o P2901-3301A	Insulator Case	
M42	o P2901-3302A	Insulator Cover A	
M43	o P2901-3303A	Insulator Cover B	
M44	o P2901-3101A	Mounting Angle for Board	

AC-DC BOARD-1

PCB9	o P29013402ASY	Printed Circuit Board Assy	
CP401 ⚠	PS2401-1	Photo Coupler	
D401 ⚠	S1VB60	Diode	
D406	ERB12-02	Didoe	
R405	YFUEEB223BB	Carbon	22K ohms 1/4W
R406	YFUEBB472BB	Carbon	4.7K ohms 1/4W
C401	YFUGCZ472AF	Ceramic	4700 pF
C402	YFUGCQ102AB	Ceramic	1000 pF
C407	YFUGAF1R0BJ	Electrolytic	1 μF 50V
L401	YFFC-023	Line Filter	
F401 ⚠	ULTSC1.6A125V	Fuse	1.6A 125V
E401	YFPU51212	Fuse Holder	
M45	oYF840620	Fuse Cover	

ACCESSORY PARTS/PACKAGING PARTS

CN10	YWRP97P4P	4 Pin Lens Connector Plug
M51	oYFV8QA0973AN	Operating Instructions for WV-CD24/E
	oYFV8QA0974AN	Operating Instructions for WV-CD24NC
M56	YFV8PA0007A4	Hex-wrench
M57	YWT050803	Polyethylene Bag
M58	YWT20X35C03	Polyethylene Bag
M60	o YFV9CA0768AN	Packaging Assy
M61	YFV8FA0070A4	Packaging Label for WV-CD24/E
	YNL1E	Packaging Label for WV-CD24/NC

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